EXHIBIT 1

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.
Petitioner

v.

GESTURE TECHNOLOGY PARTNERS LLC
Patent Owner

Case No. IPR2021-00922
U.S. Patent No. 8,553,079

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,553,079

Table of Contents

I. INTRODUCTION

Petitioner Apple Inc. ("Petitioner") requests an *Inter Partes* Review ("IPR") of claims 1–30 (the "Challenged Claims") of U.S. Patent No. 8,553,079 ("the '079 Patent").

II. SUMMARY OF THE '079 PATENT

A. The '079 Patent's Alleged Invention

The '079 Patent generally describes computer input devices employing cameras and lights to observe points on the human body and optically sense human positions and/or orientations. *'079 Patent* (Ex. 1001), 1:54-2:6. Examples of input devices contemplated by the patent include a computer keyboard, puzzle toy, and handheld computer. *Id.* at 2:15-31. Fig. 2 below illustrates one exemplary embodiment implemented in a laptop computer:

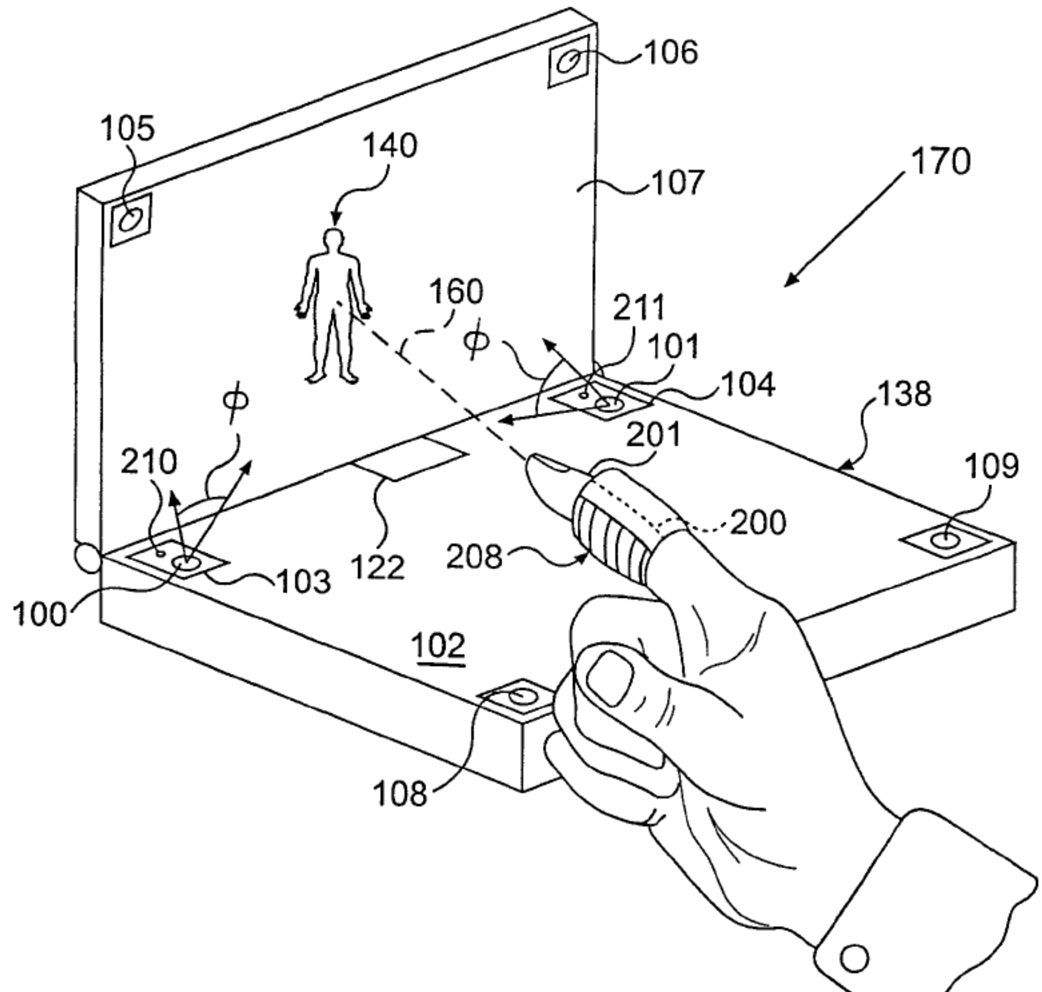


FIG. 2

Id. at Fig. 2. As illustrated, a laptop 138 may include camera locations 100, 101, 105, 106, 108, 109; keyboard surface 102; screen housing 107; light 122; light emitting diodes (LEDs) 210 and 211, and work volume area 170 within which a user's movements are detected. *Id*. at 2:39-53. The system can detect a user's finger alone or the user may employ external objects such as ring 208 to help detect and recognize gestures performed in work volume area 170. *Id.* at 2:54-3:8. The '079 Patent

describes detecting point, pinch, and grip gestures using this configuration. *Id.* at 3:48-51.

B. The ’079 Patent’s Prosecution

The Application that resulted in the ’079 Patent was filed on December 14, 2012. The Application claims priority to provisional patent application No. 60/107,652, filed November 9, 1998, through a succession of continuation applications 09/433,297; 10/866,191; and 12/700,055. *Id.* For purposes of this petition and without waiving its right to challenge priority in this or any other proceeding, Petitioner adopts November 9, 1998 as the invention date for the Challenged Claims.

Applicant canceled twenty originally filed claims (1–20) by preliminary amendment and replaced them with thirty new claims (21–50). *’079 File History* (Ex. 1002), 134-138. A Notice of Allowance issued on July 24, 2013, in which the Examiner allowed all thirty claims (renumbered 1–30) in a first office action. *Id.* at 150, 175. Examiner amended the abstract and reasoned that none of Naoi et al. (US 5459793), Platzker et al. (US 5528263), Sellers (US 5864334 A), nor Fukushima et al. (US 6346929 B1) taught or suggested the independently claimed elements: (1) providing a camera oriented to observe a gesture performed in the work volume; (2) the camera being fixed relative to the light source; and (3) determining, using the

camera, the gesture performed in the work volume and illuminated by the light source. *Id.* at 153.

C. A Person Having Ordinary Skill in the Art

A person having ordinary skill in the art ("PHOSITA") at the time of the '079 Patent would have had at least a bachelor's degree in electrical engineering or equivalent with at least one year of experience in the field of human computer interaction. Additional education or experience might substitute for the above requirements. *Bederson Dec.* (Ex. 1010), ¶¶ 29-31.

III. REQUIREMENTS FOR IPR UNDER 37 C.F.R. § 42.104

A. Standing Under 37 C.F.R. § 42.104(A)

Petitioner certifies that the '079 Patent is available for IPR and that Petitioner is not barred or estopped from requesting an IPR challenging the claims of the '079 Patent. Specifically, (1) Petitioner is <u>not</u> the owner of the '079 Patent, (2) Petitioner has <u>not</u> filed a civil action challenging the validity of any claim of the '079 Patent, and (3) this Petition is filed less than one year after the Petitioner was served with a complaint alleging infringement of the '079 Patent.

B. Challenge Under 37 C.F.R. § 42.104(B) and Relief Requested

In view of the prior art and evidence presented, claims 1-30 of the '079 Patent are unpatentable and should be cancelled. 37 C.F.R. § 42.104(b)(1). Further, based

on the prior art references identified below, IPR of the Challenged Claims should be granted. 37 C.F.R. § 42.104(b)(2).

Proposed Ground of Unpatentability	**Exhibits**
Ground 1: Claims 1, 2, 4-14, 17, 19, 21-22, 24-28, and 30 are obvious under pre-AIA 35 U.S.C. § 103 over U.S. Patent No. 6,144,366 ("*Numazaki*") in view of the knowledge of a PHOSITA	Ex. 1004
Ground 2: Claims 3, 15, and 23 are obvious under pre-AIA 35 USC § 103 over *Numazaki* in view of U.S. Patent No. 5,900,863 ("*Numazaki '863*")	Ex. 1004, Ex. 1005
Ground 3: Claims 16 and 29 are obvious under pre-AIA 35 U.S.C § 103 over *Numazaki* in view of U.S. Patent No. 6,064,354 ("*DeLuca*")	Ex. 1004, Ex. 1006
Ground 4: Claim 18 is obvious under pre-AIA 35 U.S.C § 103 over *Numazaki* in view of U.S. Patent No. 6,008,018 ("*DeLeeuw*")	Ex. 1004, Ex. 1007
Ground 5: Claim 20 is obvious under pre-AIA 35 USC § 103 over *Numazaki* in view of U.S. Patent No. 6,191,773 ("*Maruno*")	Ex. 1004, Ex. 1008

Section IV identifies where each element of the Challenged Claims is found in the prior art. 37 C.F.R. § 42.104(b)(4). The exhibit numbers of the evidence relied upon to support the challenges are provided above and the relevance of the evidence to the challenges raised is provided in Section IV. 37 C.F.R. § 42.104(b)(5). **Exhibits 1001-1016** are also attached.

C. Claim Construction Under 37 C.F.R. § 42.104(B)(3)

In this proceeding, claims are interpreted under the same standard applied by Article III courts (i.e., the *Phillips* standard). *See* 37 C.F.R § 42.100(b); *see also* 83 Fed. Reg. 197 (Oct. 11, 2018); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*). Under this standard, words in a claim are given their plain

meaning which is the meaning understood by a person of ordinary skill in the art in view of the patent and file history. *Phillips*, 415 F.3d 1303, 1212-13. For purposes of the proposed grounds below, Petitioner proposes no terms require express construction.

IV. THE CHALLENGED CLAIMS ARE UNPATENTABLE

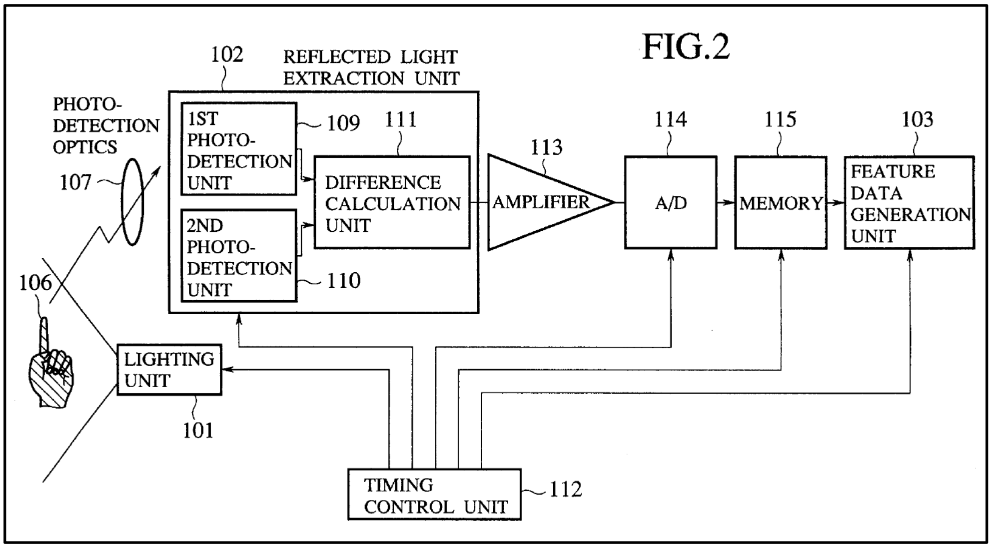
A. Ground 1: Claims 1, 2, 4-14, 17, 19, 21-22, 24-28, and 30 are obvious under pre-AIA 35 U.S.C. § 103 over *Numazaki* in view of the knowledge of a PHOSITA

Overview of Numazaki

U.S. Patent No. 6,144,366 to Numazaki et al. (*"Numazaki"*) (Ex. 1004) was filed on October 17, 1997 and is prior art to the '079 Patent under at least 35 U.S.C. § 102(e) (pre-AIA). *Numazaki* was not cited or considered during prosecution of the '079 Patent or its parent, U.S. Patent No. 6,750,848. *'079 Patent* (Ex. 1001); *'848 Patent* (Ex. 1003).

Numazaki is generally directed to a method for detecting a gesture or the movement of a user's hand. (*"Numazaki"*) (Ex. 1004), Abstract, 4:9-40. *Numazaki* purports to have improved upon prior methods by using a controlled light source to illuminate the target object (e.g., the user's hand), a first camera unit (referred to by

Numazaki as a "photo-detection unit"),[1] and a second camera unit. *Id.* at 11:9-23. This arrangement is illustrated in Fig. 2 below:



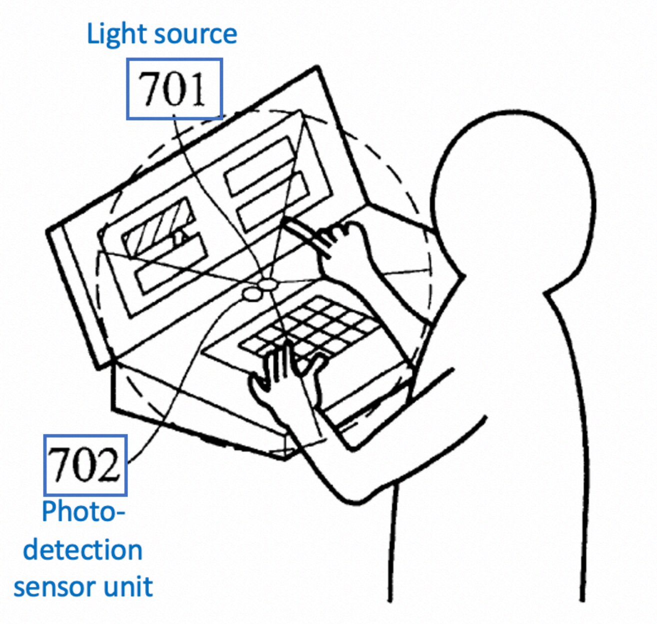
Id. at Fig. 2. A timing control unit is used to turn lighting unit 101 on (i.e., illuminating the target object) when the first camera unit is active and off when the second camera unit is active. *Id.* at 11:20-32. The result of this light control is the first camera unit captures an image of the target object illuminated by both natural light and the lighting unit 101 and the second camera unit captures an image of the target object illuminated by only natural light. *Id.* at 11:33-39. The difference

[1] A PHOSITA would have considered *Numazaki's* photo-detection units to be camera units. *Bederson Dec.* (Ex. 1010), ¶ 36 (explaining that *Numazaki* describes using CMOS or CCD sensor units, which were two of the more common optical sensors used in camera units at the time).

between the two images—obtained by difference calculation unit 111—represents the "reflected light from the object resulting from the light emitted by the lighting unit 101." *Id*. at 11:43-51. This information is then used by feature data generation unit 103 to determine gestures, pointing, etc. of the target object that may be converted into commands executed by a computer. *Id*. at 10:57-66.

In its eighth embodiment, *Numazaki* describes implementing this structure in a computer such that a user can point or gesture with an index finger while typing on the keyboard "with[] hardly any shift of the hand position." *Id*. at 50:25-43. This arrangement is illustrated in Fig. 74 below:

FIG.74



Id. at Figure 74 (annotated to indicate light source 701 and photo-detection sensor unit 702). *Numazaki* teaches the entirety of the operator's hand is illuminated within

the range depicted by the dashed circle such that the user's pointing and gestures can be captured and converted to commands. *Id.* at 50:38-48.

Numazaki teaches that its eighth embodiment incorporates "the information input generation apparatus of the present invention as described in the above embodiments." *Id.* at 50:21-24. A PHOSITA would have understood that the referenced information input generation apparatus is that illustrated in Fig. 2 and described in the corresponding disclosure. *Bederson Dec.* (Ex. 1010), ¶¶ 42-43 (explaining that *Numazaki* describes its controlled light and two-camera configuration as key to its invention and noting that *Numazaki* at 53:22-36 teaches that the eighth embodiment uses the precise image difference calculation taught by Fig. 2 and its corresponding disclosure).

Because *Numazaki*, like the '079 Patent, discloses a method and apparatus for generating computer input information by capturing hand gestures, *Numazaki* is in the same field of endeavor as the '079 Patent. *Compare Numazaki* (Ex. 1004), 50:29-37 ("In this computer of FIG. 74, a lighting unit 701 and a photo-detection sensor unit 702 of the information input generation apparatus are provided at positions beyond the keyboard" such that the "entire hand of the operator is illuminated . . . [in] a range of illumination") *with '079 Patent* (Ex 1001), Abstract (describing "[a] method for determining a gesture illuminated by a light source" that "utilizes the light source to provide illumination through a work volume above the

light source" where a "camera is positioned to observe and determine the gesture performed in the work volume"). *Numazaki* is therefore analogous art to the '079 Patent. *Bederson Dec.* (Ex. 1010)*,* ¶ 41.

i. Claim 1.

1[P] A computer implemented method comprising:

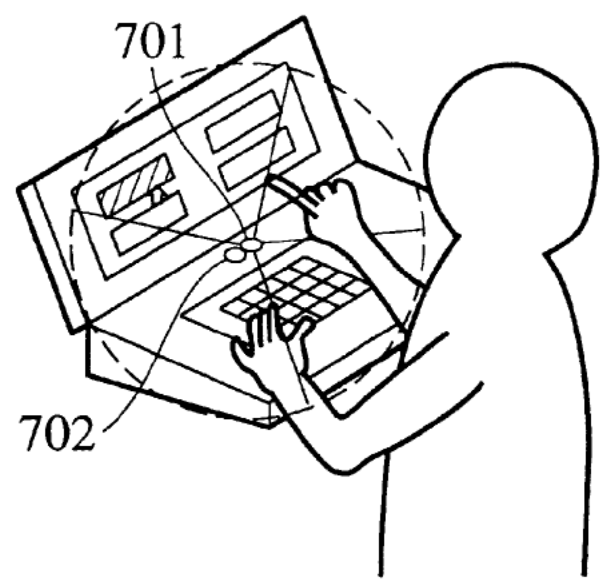
To the extent the preamble is limiting, *Numazaki* teaches a computer implemented method. In particular, *Numazaki* teaches a "method . . . for generating information input . . . capable of realizing a direct command type information input scheme by which the gesture or the motion can be inputted easily." *Numazaki* (Ex. 1004), 4:9-13.

Numazaki's eighth embodiment teaches a computer implemented method for controlling functions on a laptop device through gestures or pointing:

> In this configuration, the operator operating the keyboard can make the pointing or gesture input by slightly raising and moving the index finger. The user's convenience is remarkably improved here because the keyboard input and the pointing or gesture input can be made without hardly any shift of the hand position.

Id. at 50:38-43. This arrangement is illustrated in Fig. 74 below:

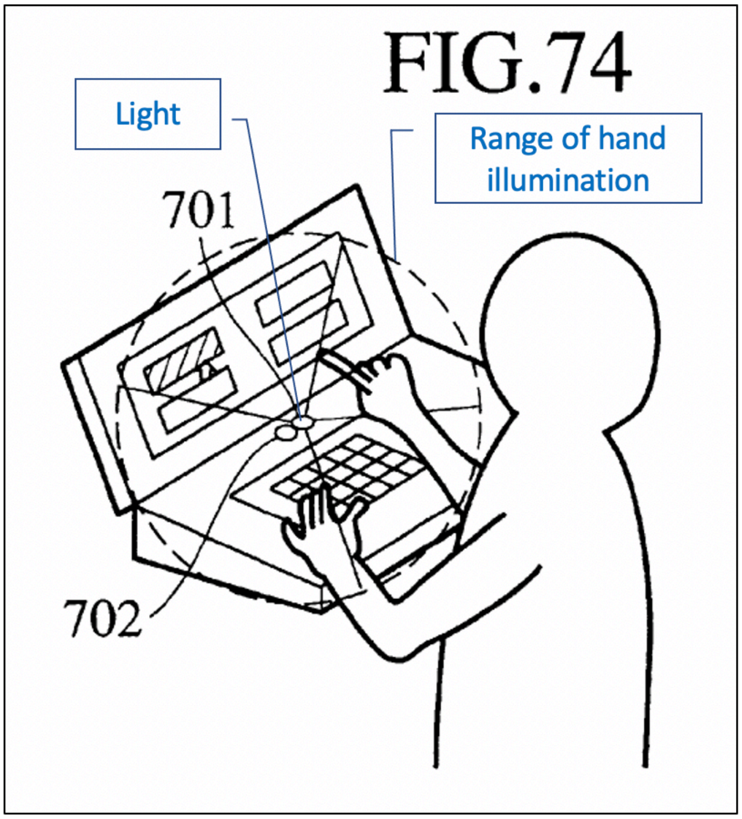
FIG.74



Id. at Fig. 74.

[1(a)] providing a light source adapted to direct illumination through a work volume above the light source;

Numazaki teaches a lighting unit 701 (i.e., light source) that is adapted to illuminate a user's hand (i.e., human body part) within a work volume generally above the light source. For example, *Numazaki* teaches "**the entire hand** of the operator is illuminated, as can be seen from a **dashed line circle indicating a range of illumination.**" *Id.* at 50:35-37 (emphasis added). As depicted in Fig. 74 below, the lighting unit 701 is adapted to illuminate the user's hand by positioning it "beyond the keyboard" to illuminate a work volume indicated by the dashed line circle above it:



Id. at Fig. 74 (annotated to illustrate light source and range of hand illumination).

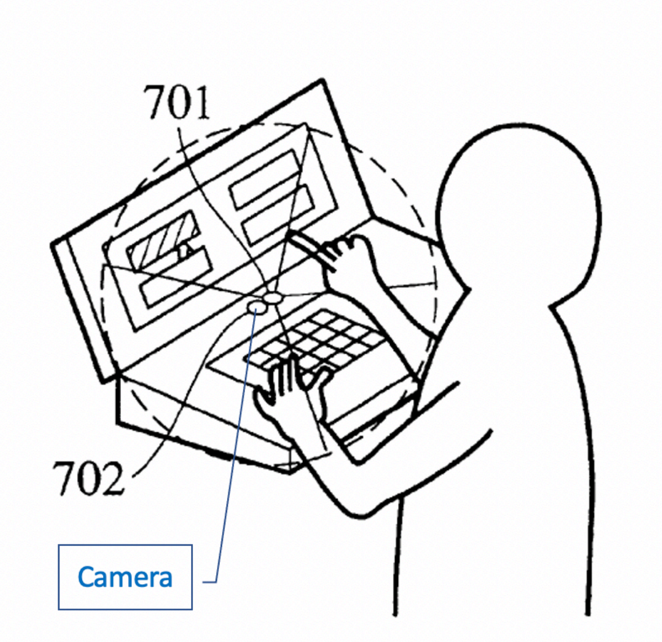
[1(b)] providing a camera oriented to observe a gesture performed in the work volume, the camera being fixed relative to the light source; and determining, using the camera, the gesture performed in the work volume and illuminated by the light source.

Numazaki discloses a photo-detection sensor unit 702 (i.e., camera[2]) that is positioned next to lighting unit 701 (i.e., in fixed location relative to the light source)

[2] As described in the overview section above, a PHOSITA would have considered *Numazaki's* photo-detection units to be camera units. *Bederson Dec.* (Ex. 1010), ¶

and arranged to have the optical axis of the photo-detection sections pointing obliquely upward towards the operator side to observe a gesture performed by the user (i.e., observe a gesture) within a "dashed line circle" (i.e., work volume) depicted below. *Id.* at 50:30-43. This arrangement is illustrated in Fig. 74 below:

FIG.74



Id. at Fig. 74 (annotated to show camera).

As described with reference to Fig. 2, which is incorporated into the eighth embodiment as noted above, *Numazaki* uses this light and camera arrangement to

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36 (explaining that *Numazaki* describes using CMOS or CCD sensor units, which were two of the more common optical sensors used in camera units at the time).

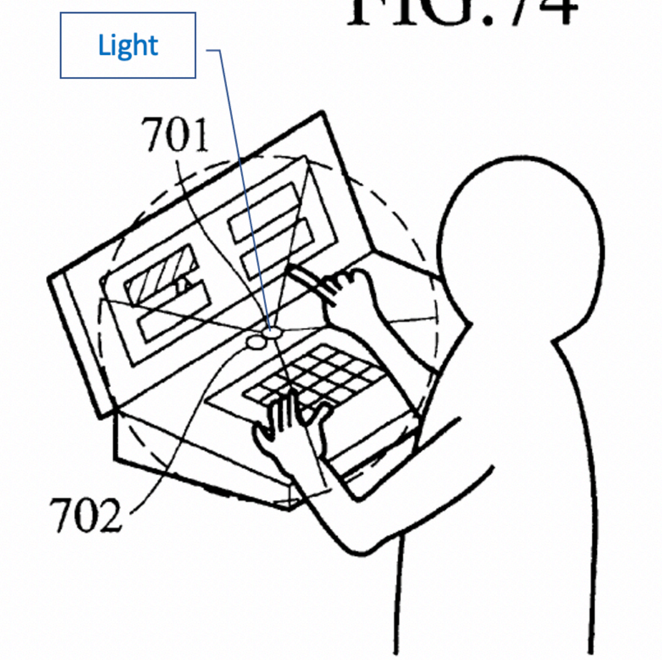
illuminate the target object (e.g., the user's hand) in a controlled manner such that a precise image of the user's hand and hand movement can be ascertained. *Id*. at 11:9-23. Specifically, a timing control unit is used to turn lighting unit 101 on (i.e., illuminating the target object) when the first camera unit is active and off when the second camera unit is active. *Id*. at 11:20-32. The result of this light control is the first camera unit captures an image of the target object illuminated by both natural light and the lighting unit 101 and the second camera unit captures an image of the target object illuminated by only natural light. *Id*. at 11:33-39. The difference between the two images – obtained by difference calculation unit 111 – represents the "reflected light from the object resulting from the light emitted by the lighting unit 101." *Id*. at 11:43-51. This information is then used by feature data generation unit 103 to determine gestures, pointing, etc. of the target object that may be converted into commands executed by a computer. *Id*. at 10:57-66. Through this arrangement, a PHOSITA would have understood that component 702 illustrated in Fig. 2 is "oriented to observe a gesture performed in the work volume" illuminated by lighting unit 701. *Bederson Dec.* (Ex. 1010), ¶¶ 42-43.

ii. Claim 2

2. The method according to claim 1 wherein the light source includes a light emitting diode.

As discussed above with reference to limitation 1[a], *Numazaki* teaches light source 701 in the embodiment depicted in Fig. 74 below:

FIG.74



Numazaki (Ex. 1004), Fig. 74; *see also* limitation 1[a], *supra*. Although *Numazaki* does not discuss the specific lighting technology contemplated for light source 701, with reference to the first embodiments, *Numazaki* teaches that an "LED can be used as the light source" since "the LED has a property that it can emit more intense light instantaneously" while "reduc[ing] the power required for the light emission." *Id.* at 14:49-56*; see also id.* at 68:13-20. Based on *Numazaki's* teachings, a PHOSITA would have been motivated to implement light source 701 in Fig. 74 using LED technology for a number of reasons. *Bederson Dec.* (Ex. 1010), ¶ 44. First, the benefit of emitting more intense light instantaneously described with reference to the first embodiment would have improved Fig. 74's apparatus such that it could

quickly and accurately detect pointing and gestures. *Id; see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) (obvious to use known techniques to improve similar devices in the same way). Second, a PHOSITA would have understood that the "note PC" depicted in Fig. 74 is a self-contained and portable unit that would have benefitted from the power reduction of an LED light source discussed with reference to the first embodiment. *Bederson Dec.* (Ex. 1010), ¶ 44 (noting that *Numazaki's* eighth embodiment contemplates other portable implementations and, at col. 52, ln. 33 – col. 53, ln. 7, expressly discusses the desire to conserve power and techniques for doing so by controlling the lighting unit).

iv. Claim 4

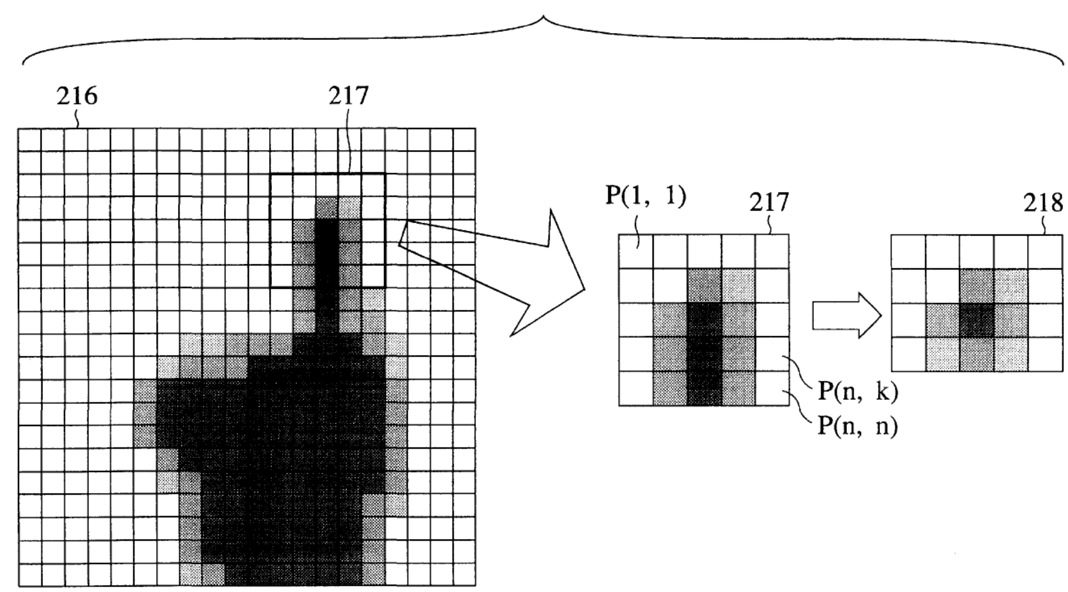
4. The method according to claim 1 wherein detecting a gesture includes analyzing sequential images of the camera.

Numazaki's eighth embodiment analyzes the sequential movement of "click and drag" operations by detecting a combination of "pointing or gesture input" and "keyboard input" via a "button for use in conjunction with the pointing or gesture input." *Numazaki* (Ex. 1004), 50:38-47. This permits "selecting and moving icons on the screen." *Id.* at 50:45-47.

A PHOSITA would have understood that using gesture recognition to implement a "click and drag" operation would have been implemented by capturing a sequence of images to determine the user's hand movement, which dictates the "drag" operation to be performed. *Bederson Dec.* (Ex. 1010), ¶¶ 45-46. Indeed, in

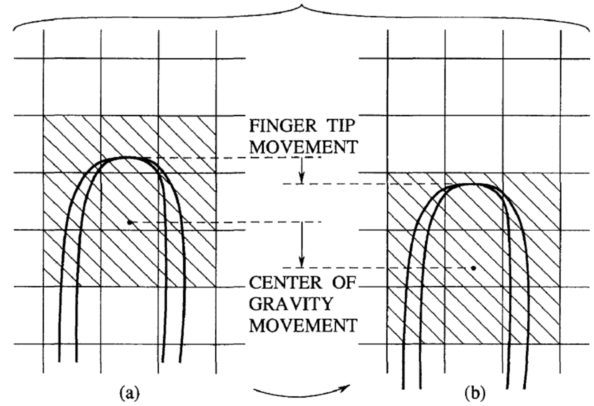
its second embodiment, *Numazaki* expressly describes a process through which the system tracks lateral finger movements by detecting the center of gravity of a finger, where "finger tip movement and the center of gravity movement can be smoothly correlated" using pixel values. *Numazaki* (Ex. 1004), 19:43-20:25. Fig. 10 below illustrates the process by which the reflected light image of a hand and finger are mapped to a pixelated target space, and Fig. 11 illustrates how coordinate-based finger movement can be tracked on the basis of pixel value changes:

FIG.10



Id. at Fig. 10, 19:13-42 (describing the same).

FIG.11A



Id. at Fig. 11A, 19:43-20:25 (describing a center of gravity tracking that enables a fingertip to be tracked). Using this technique, *Numazaki* teaches "the cursor on [a] screen can be controlled" so that "when the finger is moved, the cursor is also moved" and a cursor position depends on a fingertip position. *Id.* at 26:8-14, 26:23-25. A PHOSITA would have understood that processing such cursor control is similar to processing the "click and drag" functionality described with reference to the eighth embodiment and would have been motivated to implement the eighth embodiment to use the same processing functionality described in the second embodiment. *Bederson Dec*. (Ex. 1010), ¶¶ 45-46.

v. Claim 5

5. The method according to claim 1 wherein the detected[3] gesture includes at least one of a pinch gesture, a pointing gesture, and a grip gesture.

In the eighth embodiment, *Numazaki* teaches "the operator operating the keyboard can make [a] **pointing** or gesture input by slightly raising and moving the index finger" and consequently conduct a "click and drag" operation for "selecting and moving icons on the screen." *Numazaki* (Ex. 1004), 50:38-48. Figure 74 illustrates such an operation:

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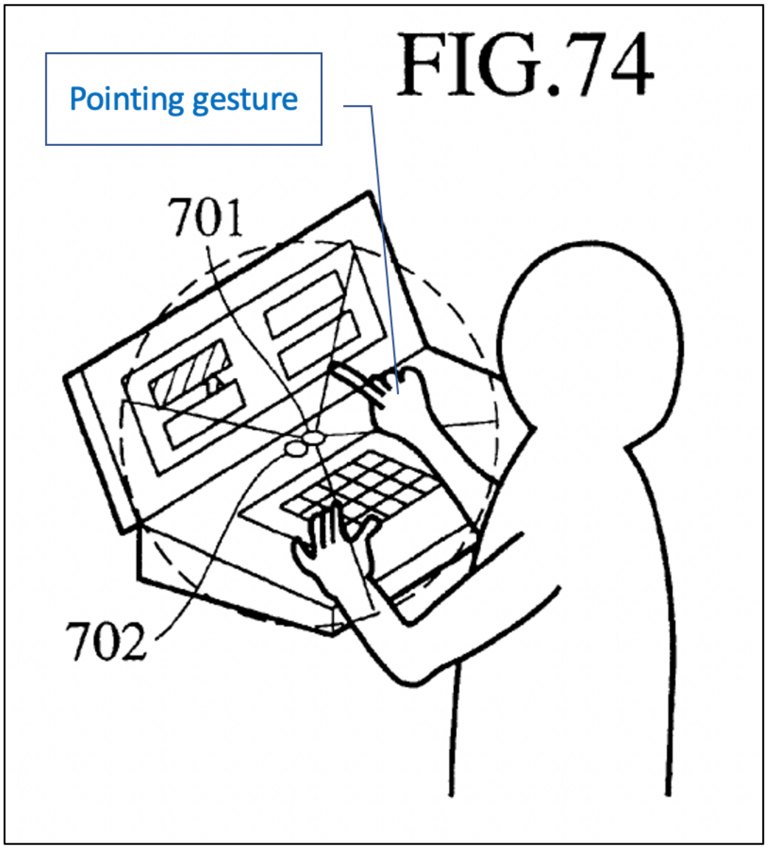
[3]Claim 5 recites "the detected gesture" of claim 1, but the term "detected" lacks antecedent basis. For purposes of this petition, Petitioner assumes "the **detected** gesture" of claim 5 is a reference to Claim 1's "**determining**, using the camera, the gesture performed in the work volume and illuminated by the light source."

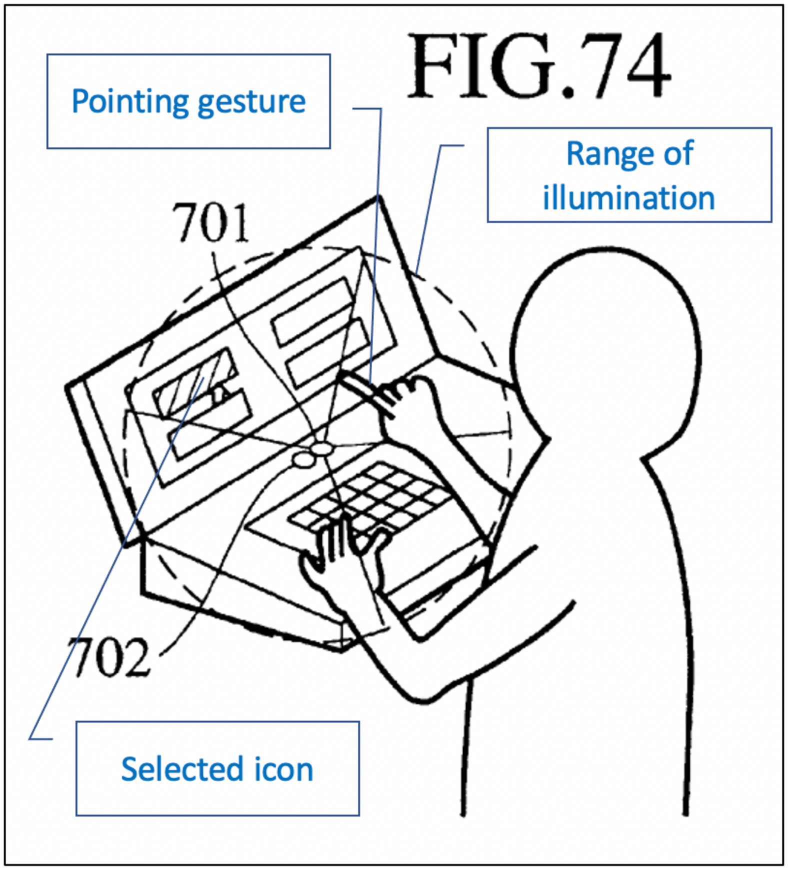


Id. at Fig. 74 (annotated to show pointing gesture).

vi. Claim 6

6. The method according to claim 1 further including determining the pointing direction of a finger in the work volume.

In the eighth embodiment, *Numazaki* teaches "the operator operating the keyboard can make [a] pointing or gesture input by slightly raising and moving the index finger" and consequently conduct a "click and drag" operation for "selecting and moving icons on the screen." *Id.* at 50:38-48. Any operator hand movements used as computer inputs are detectable within the volume of space *Numazaki* refers to as a "range of illumination." Figure 74 illustrates this operation:

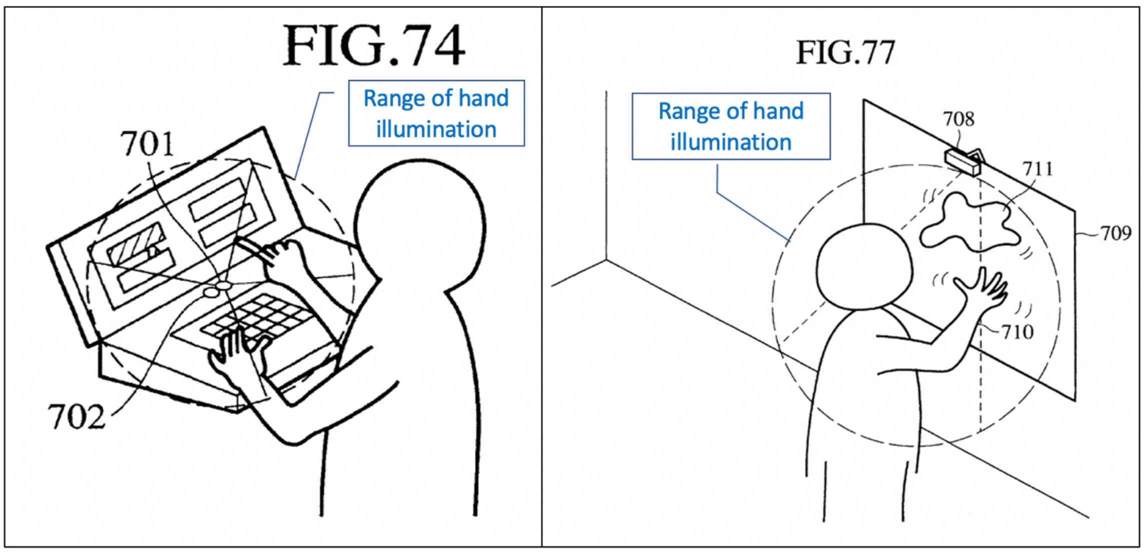


Id. at Fig. 74 (annotated to show pointing gesture, icon selection, and range of illumination). A PHOSITA would have understood that determining the pointing direction of a finger in a work volume is necessary to implement the described "click and drag" feature. *Bederson Dec.* (Ex. 1010), ¶ 47 (explaining that the pointing direction of a finger is necessary to determine which icon a user intends to select and how far and in which direction the icon is to be moved).

vii. Claim 7

7. The method according to claim 1 further including providing a target positioned on a user that is viewable in the work volume.

As depicted in Figures 74 and 77, *Numazaki's* eighth embodiment also teaches "the **entire hand** of [an] operator **is illuminated**, as can be seen from a dashed line circle indicating a range of illumination" *Numazaki* (Ex. 1004), 50:35-37 (emphasis added).



Id. at Figs. 74, 77 (annotated to illustrate the expanding range of illumination for capturing hand gestures). In this configuration, the user's hand operates within, and is detectable within, an illuminated work volume. *Numazaki* discloses the user's hand itself as a target object in the range of illumination:

> When the **target object is a hand,** it becomes possible to obtain the information regarding a gesture or a pointing according to the feature data extracted from the reflected light image of the hand . . . and it becomes possible to operate a computer by using this obtained information.

Id. at 10:57-66 (emphasis added). *Numazaki* discloses additional hand attributes as subsidiary targets, including color, material, and shape information. *Id.* at 16:45-61. The orientation of the hand also creates different targets with different distances extracted from the hand as a target object to help extract its overall "3D shape." *Id.* at 12:27-45.

Although the above disclosures in *Numazaki* utilize natural characteristics of a user's hand to improve target detection, *Numazaki* also notes that it was known in the prior art to position a target on a user (i.e., something that is added to a user's person) in order to improve target detection. For example, *Numazaki* notes that it was known to paint a fingertip or to wear a ring in a particular color to improve detection. *Id*. at 3:4-11. *Numazaki*, however, cautions that requiring users to wear or mount some external component may negatively impact the user's convenience and may bring with it durability issues. *Id*. at 3:32-38. A PHOSITA would have understood, however, that the Fig. 74 arrangement described in the eighth embodiment is particularly well suited to a ring or other small target mounted on a user's finger. *Bederson Dec.* (Ex. 1010), ¶¶ 48-49. Given the option of improved accuracy in exchange for the minor inconvenience of wearing a small ring or other hand-based target when using gesture recognition while typing, a PHOSITA would have understood that many users would accept this tradeoff. *Id*. Indeed, the durability concerns are implicated by a ring target, and many adults wear rings

routinely while typing with no ill effect, which suggests that such a tradeoff would be acceptable to many users. *Id*.

viii. Claim 8

8. The method according to claim 1 further including determining the three-dimensional position of a point on a user.

As noted above, *Numazaki's* eighth embodiment uses the "information input generation apparatus" of Fig. 2 to detect and process a user's gestures. Within this Fig. 2 apparatus, feature data generation unit 103 determines three-dimensional information representing the user's hand:

> The feature data generation unit 103 extracts various feature data from the reflected light image. Many different types of the feature data and their extraction methods can be used in the present invention, as will be described in detail in the later embodiments. **When the target object is a hand**, it becomes possible to obtain the information regarding a gesture or a pointing according to the feature data extracted from the reflected light image of the hand, for example, and it becomes possible to operate a computer by using this obtained information. **It is also possible to extract the 3D information on the target object for further utilization**.

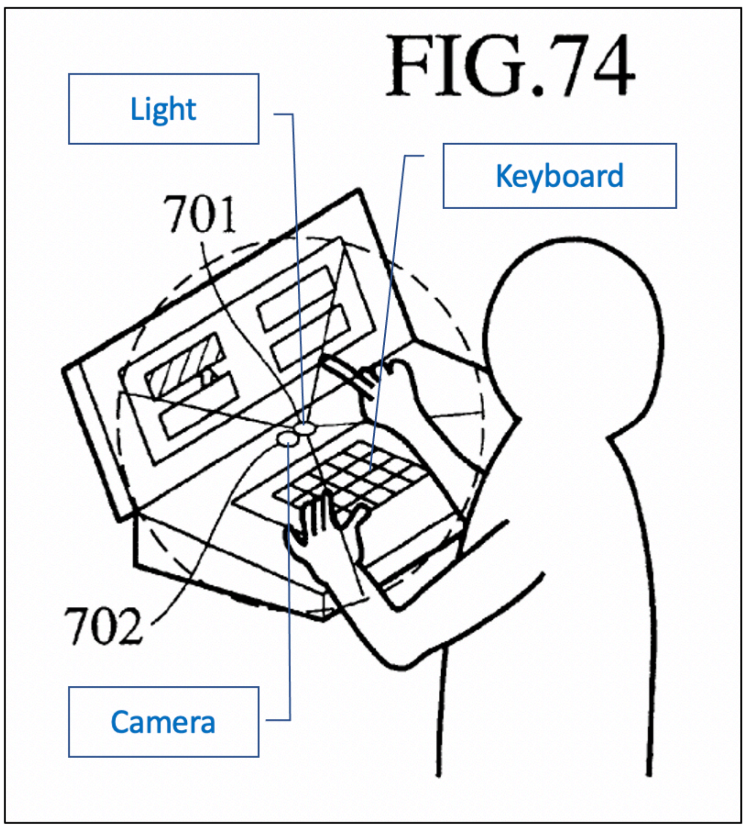
Numazaki (Ex. 1004), 10:57-67 (emphasis added). A PHOSITA would have understood that detecting a three-dimensional representation of a user's hand involves determining the three-dimensional position of at least one "point on a user" as claimed. *Bederson Dec.* (Ex. 1010), ¶ 50 (explaining that representing a hand in three-dimensions necessarily involves ascertaining the three-dimensional position of a plurality of points on the user's hand).

Further, *Numazaki* uses distance- and region-based extraction methods to track the uniformity or homogeneity of a surface reflecting light to extract a 3D shape of a user's hand (e.g., detect the uneven palm of a hand). *Numazaki* (Ex. 1004), 16:34-44.

ix. Claim 9

9. The method according to claim 1 wherein the camera and the light source are positioned in fixed relation relative to a keypad.

Numazaki's eighth embodiment places the light source and camera above a keyboard as depicted in Figure 74 below:



Id. at Fig. 74 (annotated to show keyboard in relation to light source and camera).

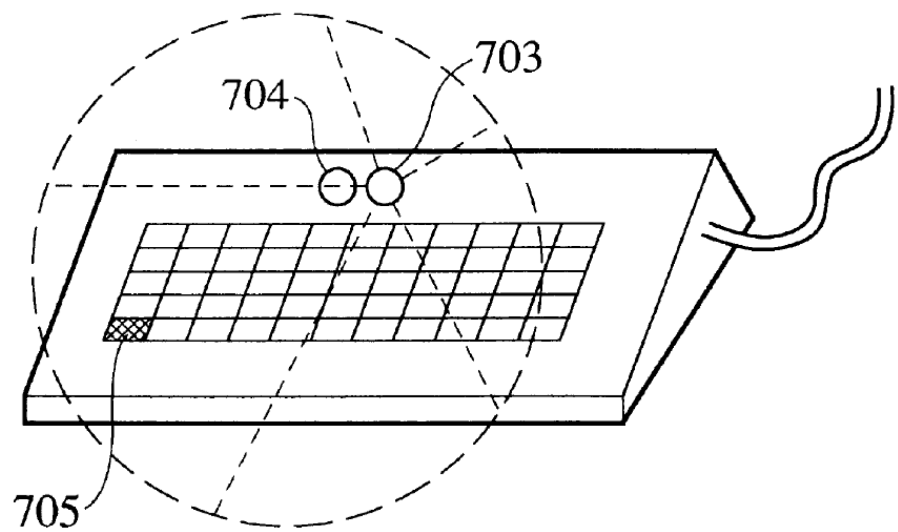
Numazaki further teaches that the lighting and camera units are mounted in a fixed location just above the keyboard:

> This computer of FIG. 74 is a portable computer generally called note PC in which a **keyboard** and a **display** are integrally provided with the computer body. In this computer of FIG. 74, a **lighting unit 701** and a **photo-detection sensor unit 702** of the information input generation apparatus **are provided at positions beyond the keyboard** when viewed from an operator side, and **arranged** to have the optical axis of the photo-detection sections pointing obliquely upward towards the operator side.

Id. at 50:25-35. This positioning ensures "the entire hand of the operator is illuminated" within the "dashed line circle . . . range of illumination." *Id.* at 50:35-37.

Even when using a keyboard separate from the display as illustrated in Fig. 75, *Numazaki* teaches keeping a lighting unit 703 and photo-detection sensor unit 704 at "**positions in such a positional relationship with the keyboard that the light is irradiated onto the hand** when the hand is raised from the home position of the keyboard." *Id.* at 51:13-15 (emphasis added).

FIG.75

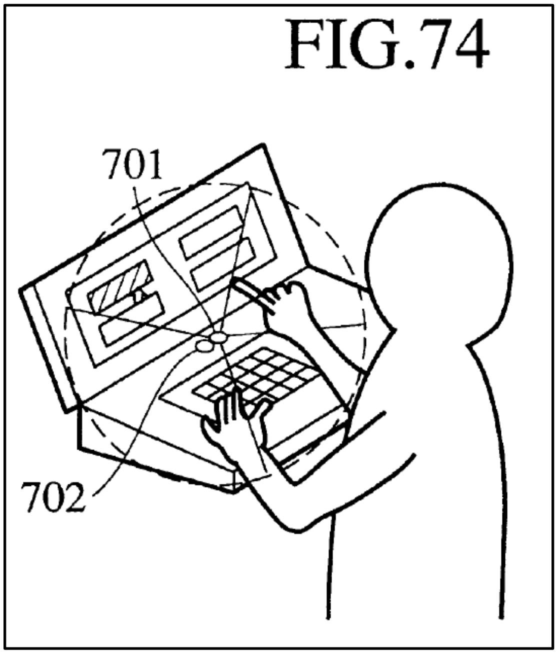


Id. at Fig. 75.

x. Claim 10

10. The method according to claim 9 the camera, the light source and the keypad form part of a laptop computer.

Numazaki teaches a configuration that arranged all of a light source, camera, and keypad together on a laptop computer as depicted in Figure 74 below:



Id. at Fig. 74; *see also id*. at 50:25-35 (describing a "portable computer generally called note PC" comprising a keyboard, display, lighting unit 701, and photo-detection sensor unit 702); *Bederson Dec.* (Ex. 1010), ¶ 51 (explaining that "note PC" is a term used to describe laptop computers and concluding the device depicted in Fig. 74 is a laptop computer).

xi. Claim 11

11[P] A computer apparatus, comprising:

To the extent the preamble is limiting, *Numazaki* teaches a computer apparatus in an eighth embodiment that includes a "computer of FIG. 74 [that] is a portable computer generally called note PC in which a keyboard and a display are integrally provided with the computer body." *Numazaki* (Ex. 1004), 50:27-29.

11[a] a light source adapted to illuminate a human body part within a work volume generally above the light source;

See limitation 1[a], *supra.*

11[b] a camera in fixed relation relative to the light source and oriented to observe a gesture performed by the human body part in the work volume; and a processor adapted to determine the gesture performed in the work volume and illuminated by the light source based on the camera output.

See limitation 1[b], *supra.* As explained above with reference to limitation 1[b], *Numazaki's* eighth embodiment utilizes the information input generation apparatus illustrated in Figs. 1 and 2 described with reference to the first embodiment. This apparatus determines a user's gesture with feature data generation unit 103. *Id.* at 10:57-11:4. In its second embodiment, *Numazaki* describes an implementation of the feature data generation unit that specifically targets hand-based pointing gestures. *Id*. at 17:15-35. *Numazaki* notes that this hand-based gesture detection implementation may be realized "in a form of software" that implements the flowcharts depicted in Figs. 13-15. *Id*. at 20:36-47. For a number of reasons, a PHOSITA would have understood that implementing the feature data generation unit in software would have been particularly well suited to the laptop embodiment depicted in Fig. 74. *Bederson Dec.* (Ex. 1010), ¶ 52. First, because the flowcharts in Fig. 13-15 are designed to detect gestures performed by fingers, they would benefit the pointing gestures described with reference to the eighth embodiment. *Id*. Second, laptop computers are equipped with general purpose processors that implement a

wide variety of software-based routines. It would have been well within the abilities of a PHOSITA to use the laptop processor in Fig. 74 to implement a software-based version of feature data generation unit 103. *Id*.

xii. Claim 12

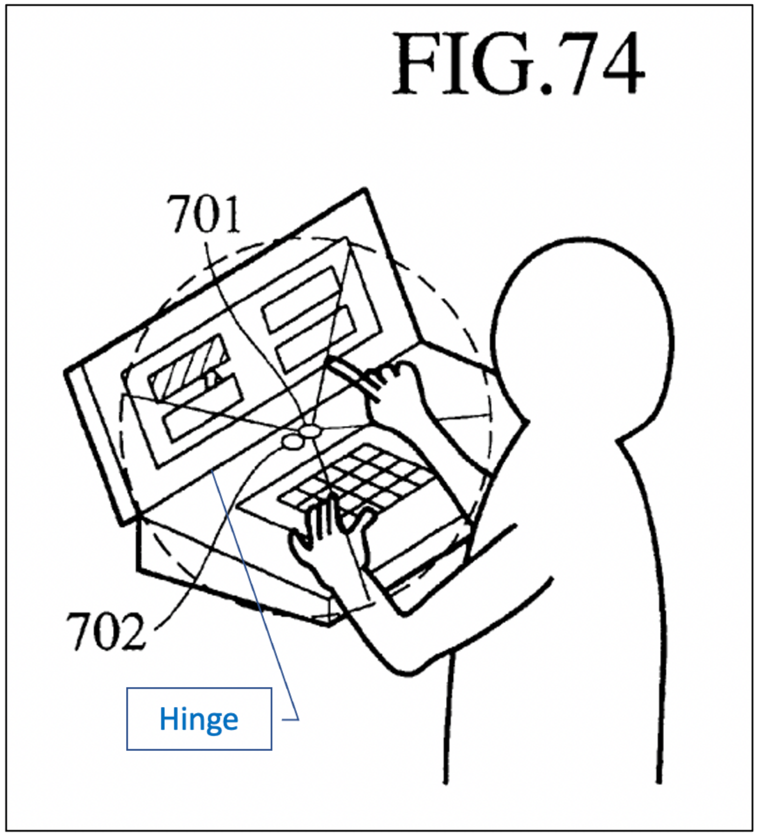
12. The computer apparatus of claim 11 further including a display and a keyboard, wherein the work volume is above the keyboard and in front of the display.

See limitations [11(a-b)], *supra.*

xiii. Claim 13

13. The computer apparatus of claim 12 wherein the display is pivotable relative to the keyboard.

As depicted in Fig. 74 below, *Numazaki* teaches a laptop computer configuration with keyboard and display pivotable about a hinge:



Numazaki (Ex. 1004), Fig. 74 (annotated to show hinged portion). Indeed, U.S. Patent 5,900,863 ("*Numazaki '863*"), which also lists Shunichi Numazaki as the inventor and has a common assignee with *Numazaki*, include Fig. 43, which depicts the exact laptop computer as *Numazaki's* Fig.74:

FIG. 43

Numazaki '863 (Ex. 1005), Fig. 43. *Numazaki '863* also refers to the depicted device as a "portable computer" and expressly notes there is a "hinge connecting the display to the main body of the portable computer." *Id.* at 35:32-36. Accordingly, a PHOSITA would have understood that Fig. 74 in *Numazaki* does in fact depict a laptop computer with a hinge connecting the display portion to the main body on which the keyboard is mounted. *Bederson Dec.* (Ex. 1010), ¶ 53.

xiv. Claim 14

14. The computer apparatus of claim 11 wherein the light source includes a light emitting diode.

Numazaki teaches a light source with light emitting diode. *See* Claim 2, *supra.*

xvii. Claim 17

17. The computer apparatus of claim 11 further including a target that is viewable by the camera when in the work volume.

See limitation 1[b] and Claim 7, *supra.*

xix. Claim 19

19. The computer apparatus of claim 11 wherein the determined gesture includes a pointing gesture.

See Claim 5, *supra.*

xxi. Claim 21

21[P] A computer implemented method comprising:

See limitation 1[P], *supra.*

21[a] providing a camera oriented to observe a gesture performed in a work volume above the camera;

See limitations 1[b] and 11[b], *supra.*

21[b] providing a light source in fixed relation relative to the camera and adapted to direct illumination through the work volume; and

See limitation 1[a-b], 11[b], *supra.*

21[c] detecting, using the camera, a gesture performed by at least one of a user's fingers and a user's hand in the work volume.

See limitations 1[c], 11[a], 11[b], *supra.*

xxii. Claim 22

22. The method according to claim 21 wherein the light source includes a light emitting diode.

See Claim 2, *supra.*

xxiv. Claim 24

24. The method according to claim 21 wherein detecting a gesture includes analyzing sequential images of the camera.

See Claim 4, *supra.*

xxv. Claim 25

25. The method according to claim 21 wherein the detected gesture includes at least one of a pinch gesture, a pointing gesture, and a grip gesture.

See Claim 5, *supra.*

xxvi. Claim 26

26. The method according to claim 21 further including determining the pointing direction of one of the user's fingers using the first and second[4] cameras.

See limitation 1[b] and Claim 6, *supra.*

xxvii. Claim 27

27. The method according to claim 21 further including providing a target positioned on the user that is viewable by the camera.

See Claim 7, *supra.*

[4] There is no antecedent basis for a "second camera." For purposes of this petition, Petitioner construes Claim 26 to require **multiple** cameras.

xxviii. Claim 28

28. The method according to claim 21 further including determining the three-dimensional position of a point on at least one of the user's hand and the user's fingers.

See Claim 8, *supra.*

xxx. Claim 30

30. The method according to claim 21 wherein the camera and the light source are positioned in fixed relation relative to a keypad.

See Claim 9, *supra.*

B. Ground 2: Claims 3, 15, and 23 are obvious under pre-AIA 35 U.S.C. § 103 over *Numazaki* in view of *Numazaki '863*

Overview of Numazaki '863

Numazaki '863 discloses several embodiments of a "data input apparatus and an image-processing method which enable[s] people to use portable computers at any place with high efficiency." *Numazaki '863* (Ex. 1005), 5:57-60. In a first embodiment, *Numazaki '863* teaches an input device that employs an LED array depicted by Figure 4:

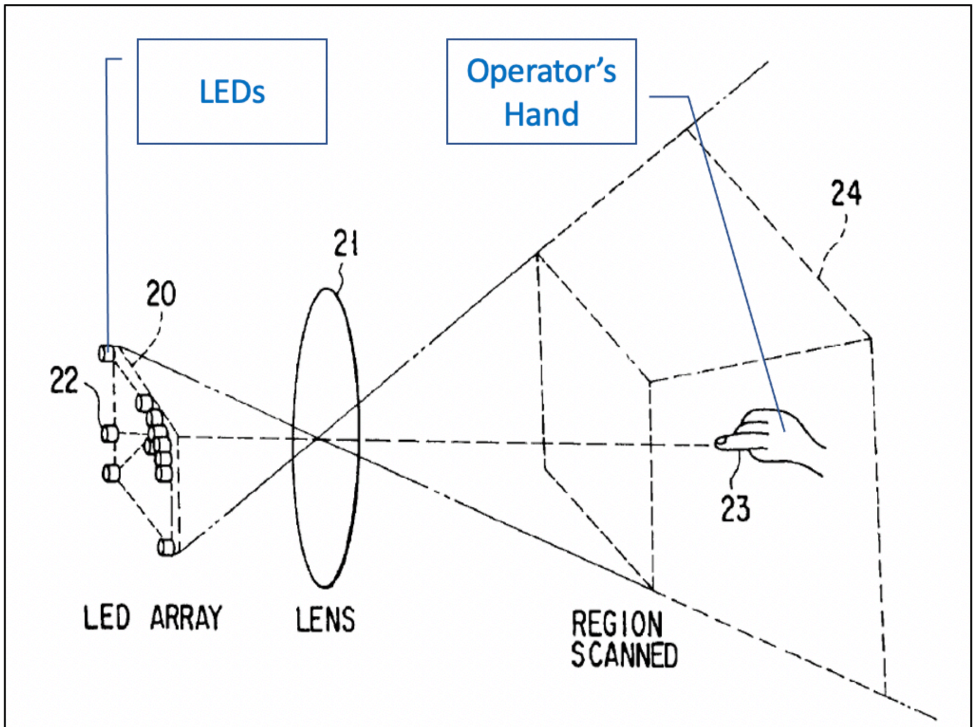


FIG. 4

Id. at Fig. 4 (annotated to illustrate multiple LEDs and operator hand detection), 14:63-65 (describing the first embodiment as a data input apparatus).

By using a plurality of LEDs 22, sequentially driven, the input device of Figure 4 realizes a range finding functionality that illuminates "an object 23, e.g., an operator's hand" and "catch[es] the beam reflected from the object" so that the "distance to the object 23 can therefore be detected." *Id.* at 16:36-50. *Numazaki '863* expressly contemplates using this multiple-LED configuration of the first embodiment in a portable computer configuration:

> As can be understood from the above, **the data input device according to the first embodiment** of the invention enables the user to move the cursor on the display screen of a **portable data-processing apparatus**

> **such as a notebook computer or a PDA**, merely by extending his finger toward the display screen and moving it.

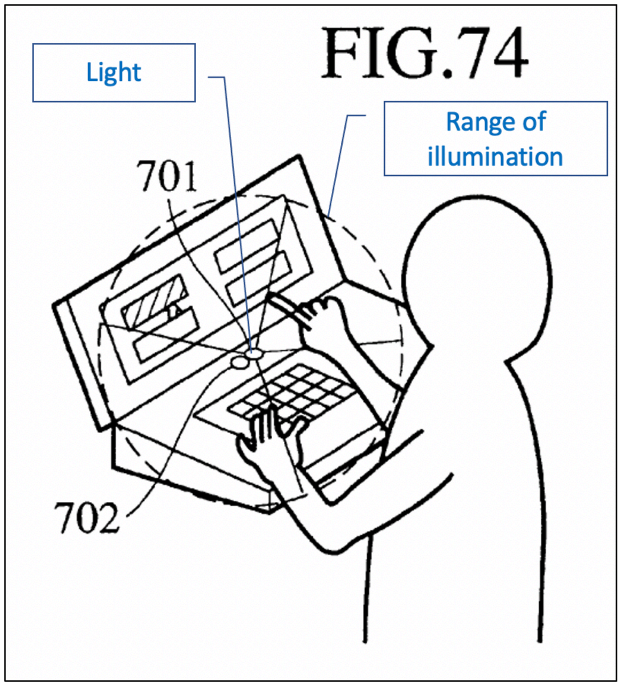
Id. at 44:36 - 41 (emphasis added).

Because *Numazaki '863*, like the '079 Patent, discloses a method and apparatus for generating computer input information by capturing hand gestures, *Numazaki '863* is in the same field of endeavor as the '079 Patent. *Compare Numazaki '863* (Ex. 1005), 5:57-60, 16:36-50, 26:61-67 (describing a "data input apparatus and an image-processing method which enable[s] people to use portable computers at any place with high efficiency" by using a "range finder" with a "plurality of LEDs" to emit and detect beams of light reflected from "an operator's hand" to determine a "specific distance" to that hand and subsequently "detect and track the designating point set by the user," *e.g.,* "move a cursor in a display screen . . . in accordance with the user's hand signal.") *with '079 Patent* (Ex 1001), Abstract (describing "a method for determining a gesture illuminated by a light source" that "utilizes the light source to provide illumination through a work volume above the light source" where a "camera is positioned to observe and determine the gesture performed in the work volume").

Numazaki '863 is therefore analogous art to the '079 Patent. *Bederson Dec.* (Ex. 1010), ¶¶ 54-55.

Motivation to Modify Numazaki in view of Numazaki '863

Numazaki uses light source 701 to illuminate a range of illumination encompassing the entirety of an operator's hand as depicted below:



Numazaki (Ex. 1004), Fig. 74 (annotated to show the range of illumination corresponding to a light source), 50:25-37 (describing the same). As discussed in Claim 2 above, *Numazaki* teaches an "LED can be used as the light source" since "the LED has a property that it can emit more intense light instantaneously" while "reduc[ing] the power required for the light emission." *Id.* at 14:49-56; see *also id.* at 68:13-20.

Although *Numazaki* does not expressly contemplate using a plurality of LEDs for light source 701, a PHOSITA would have been motivated to do so for a number

of reasons. First, a PHOSITA would have understood that modifying *Numazaki* in this manner would have improved *Numazaki's* device in the same way distance calculations benefit *Numazaki '863* by allowing it to calculate distances as part of the hand gesture recognition. *Bederson Dec.* (Ex. 1010), ¶¶ 56-58 (discussing *Numazaki '863* (Ex. 1005), 15:41-47, and concluding that distance calculations within the context of the pointing or gesture input functionality contemplated by *Numazaki's* eighth embodiment would be improved by ensuring that the system can accurately detect small movements of a user's finger when raised from the keyboard as *Numazaki* contemplates); *see also KSR*, 550 U.S. at 417 (obvious to use known techniques to improve similar devices in the same way). Indeed, *Numazaki* expressly contemplates extracting distance information from a user's hand. *Numazaki* (Ex. 1004), 16:39-44 (noting that "it is possible to extract a 3D shape of . . . [a] hand," that "it is possible to detect an inclination of the palm of the hand, which appears as a partially different distances[,]" and that "when the hand is moved, the change of the pixel values can be regarded as a change of the distance"). Second, a PHOSITA would have anticipated success in modifying *Numazaki* to increase the number of LEDs used for light source 701 because such a modification is a straightforward application of the known range finding technique described by the same inventor in the context of a nearly identical system. *Bederson Dec.* (Ex. 1010), ¶ 59 (describing the similarities between *Numazaki* and *Numazaki '863* and concluding the described

modification would have been well within the skill set of a PHOSITA); *see also* *KSR*, 550 U.S. at 416 (obvious to combine prior art elements according to known methods to yield predictable results).

iii. Claim 3

3. The method according to claim 1 wherein the light source includes a plurality of light emitting diodes.

As discussed in the overview section, *supra*, it would have been obvious to modify Numazaki's Fig. 74 embodiment to use an LED array as described in *Numazaki '863. Numazaki '863* discloses several embodiments of a "data input apparatus and an image-processing method which enable[s] people to use portable computers at any place with high efficiency." *Numazaki '863* (Ex. 1005), 5:57-60. In a first embodiment, *Numazaki* '863 teaches an "input device" that employs an "LED array" depicted by Figure 4. *Id.* at 14:63-64.

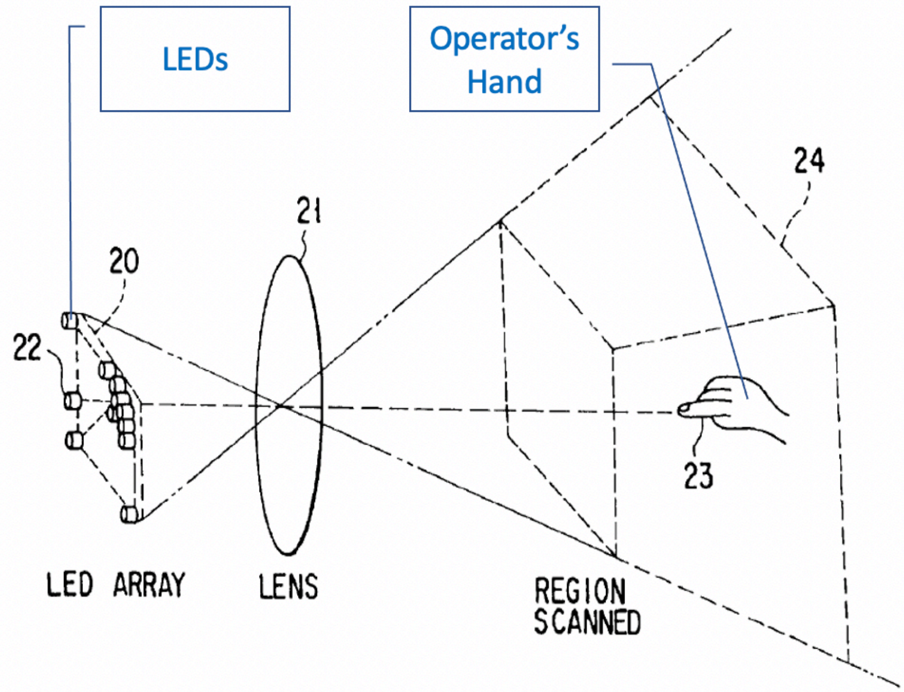


FIG. 4

Id. at Fig. 4 (annotated to highlight plurality of LEDs). The input device of Figure 4 includes a distance-finding range finder that has "a plurality of LEDs 22 . . . arranged in rows and columns" to form a "two-dimensional LED array 20" which emits beams "applied . . .to an object 23, e.g., an operator's hand." *Id.* at 16: 36-44. A position sensitive detector, or PSD, then "catch[es] the beam reflected from the object 23" to determine a distance to it with "fairly high accuracy." *Id.* at 16:45-55.

Numazaki '863 also expressly contemplates using this multiple-LED configuration of the first embodiment in a portable computer configuration:

> As can be understood from the above, **the data input device according to the first embodiment** of the invention enables the user to move the cursor on the display screen of a **portable data-processing apparatus**

> **such as a notebook computer or a PDA**, merely by extending his finger toward the display screen and moving it.

Id. at 44:36-41 (emphasis added).

xv. Claim 15

15. The computer apparatus of claim 11 wherein the light source includes a plurality of light emitting diodes.

See Claim 3, *supra.*

xxiii. Claim 23

23. The method according to claim 21 wherein the light source includes a plurality of light emitting diodes.

See Claim 3, *supra.*

C. Ground 3: Claims 16 and 29 are obvious under pre-AIA 35 U.S.C. § 103 over *Numazaki* in view of *DeLuca*

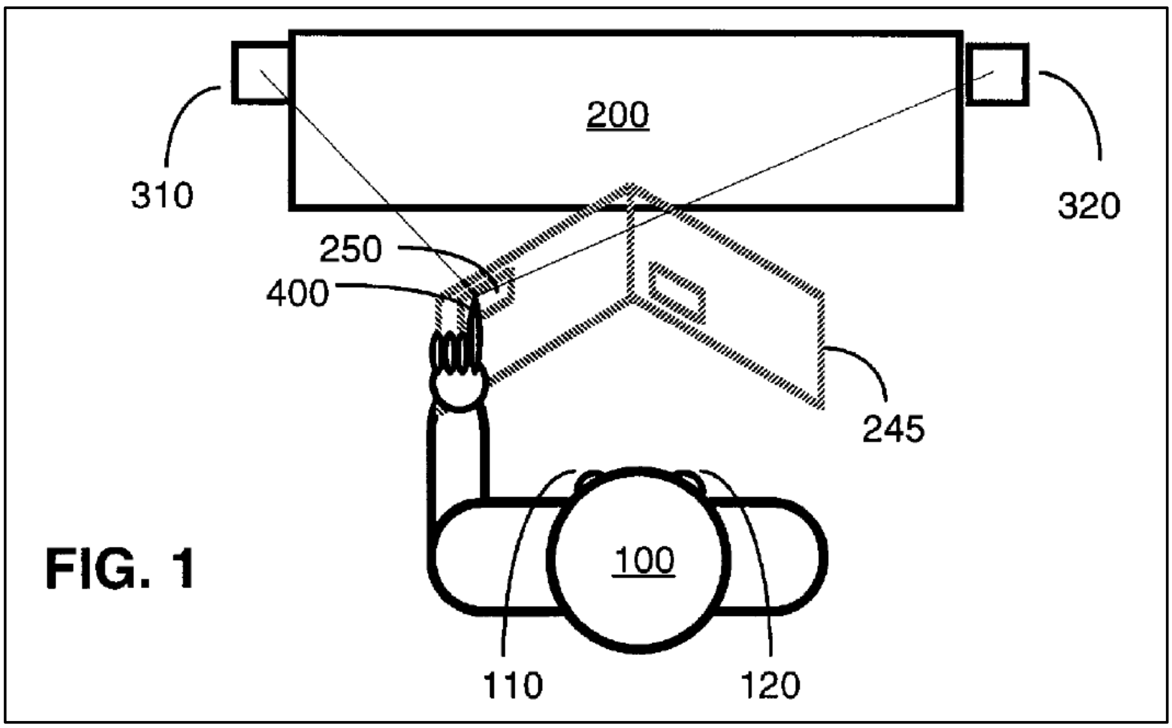
Overview of DeLuca

U.S. Patent No. 6,064,354 to DeLuca (*"DeLuca"*) (Ex. 1006) was filed on July 1, 1998 and is prior art to the '079 Patent under at least 35 U.S.C. § 102(e) (pre-AIA). *DeLuca* was not cited or considered during prosecution of the '079 Patent or its parent, U.S. Patent No. 6,750,848. *'079 Patent* (Ex. 1001); *'848 Patent* (Ex. 1003).

DeLuca discloses a "computer system" that "stereoscopically projects a three dimensional object having an interface image in a space observable by a user" where the "user controls the movement of a physical object within the space" while observing both the projected and physical object. *DeLuca* (Ex. 1006), Abstract. In

one example, a user can activate a "word processing program . . . when the user's finger moves within the [3D] space to touch the projected icon" that is a "W" representing the word processing program. *Id.*

Figures 1 and 5 depicts a physical object, such as fingertip 400, used to touch an icon 250, which is part of the stereoscopically projected object 245. *Id.* at 2:44-51; 4:9-10. Cameras 310 and 320 determine the position and orientation of the fingertip. *Id.* at 5:22-43.



Id. at Fig. 1.

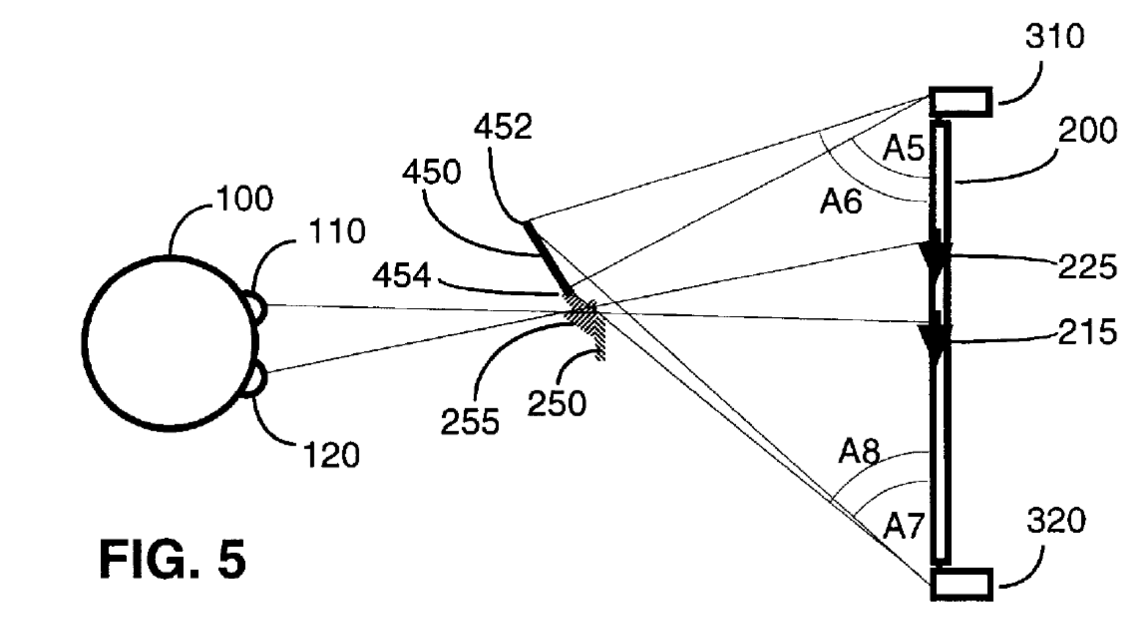


FIG. 5

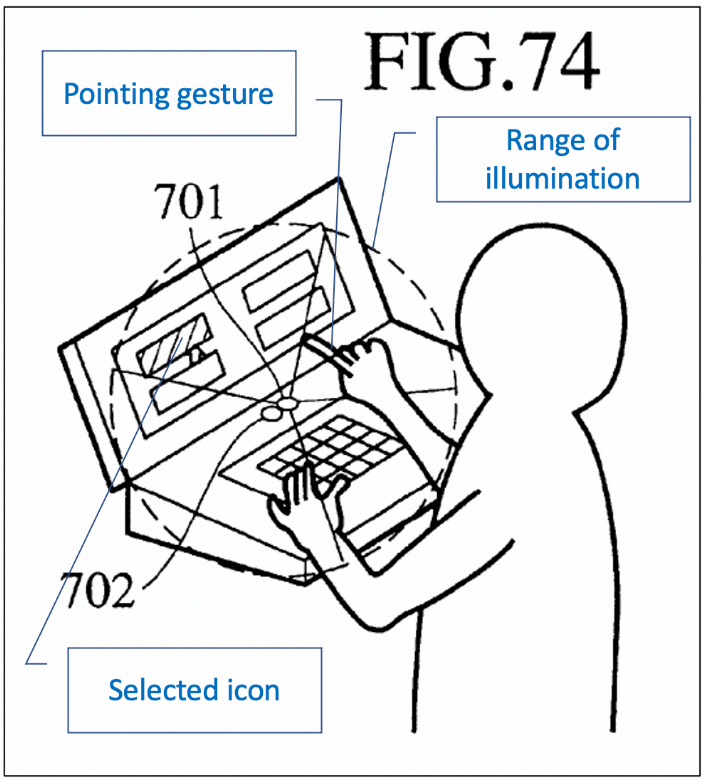
Id. at Fig. 5.

Because *DeLuca,* like the '079 Patent, discloses a method and apparatus for generating computer input information by capturing hand gestures, *DeLuca* is in the same field of endeavor as the '079 Patent. *Compare DeLuca* (Ex. 1006), Fig. 1, 1:63-66, Abstract (describing "a three dimensional display system capable of determining an intersection of a physical object with a three dimensionally displayed object in a space," such as a "word processing program . . . activated when the user's finger moves within the space to touch the projected icon") w*ith '079 Patent* (Ex 1001), Abstract (describing "[a] method for determining a gesture illuminated by a light source" that "utilizes the light source to provide illumination through a work volume above the light source" where a "camera is positioned to observe and determine the gesture performed in the work volume").

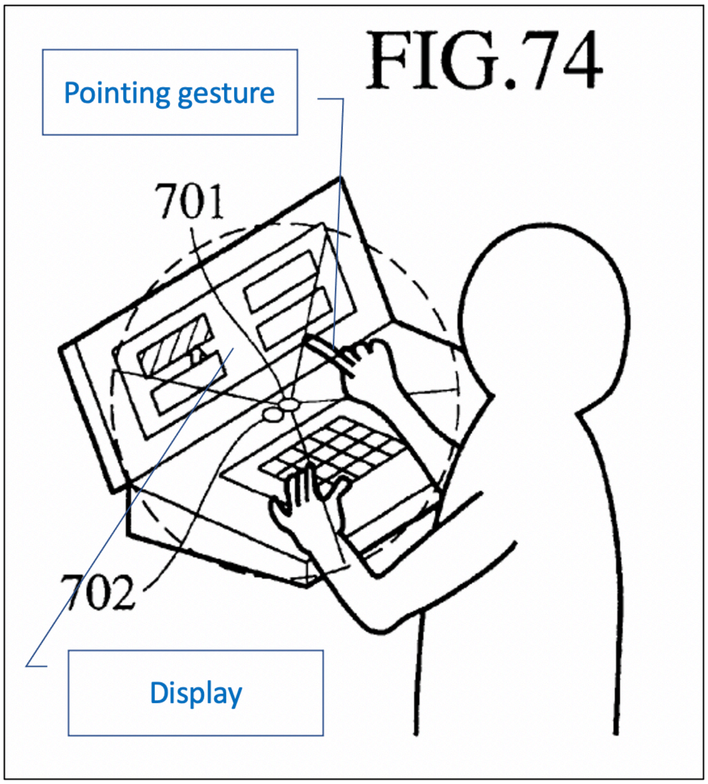
DeLuca is therefore analogous art to the '079 Patent. *Bederson Dec.* (Ex. 1010), ¶¶ 60-62.

Motivation to Modify Numazaki in view of DeLuca

In an eighth embodiment depicted in Figure 74, *Numazaki* detects a pointing gesture within a "range of illumination" by using light source 701 and camera 702 and uses these detected gestures as an input to select and move icons on a screen. *Numazaki* (Ex. 1004), 50:25-47.



Id. at Fig. 74 (annotated to illustrate capturing a pointing gesture within a portable computer's range of illumination to select an icon). This portable computer configuration includes a display. *Id.* at 50:27-28.



Id. at Fig. 74 (annotated to illustrate pointing at a portable computer's two-dimensional display).

Although *Numazaki* describes a three-dimensional workspace within which a user can point or gesture within the three-dimensional space over the keyboard to interact with an application, it does not explicitly teach projecting the application into three-dimensional space. For a number of reasons, however, a PHOSITA would have been motivated to implement *Numazaki's* Fig. 74 embodiment with a projected three-dimensional display pursuant to *DeLuca*. First, a PHOSITA would have understood that modifying *Numazaki* in this manner would have improved the user experience in the same way *DeLuca's* system allows a user to more intuitively

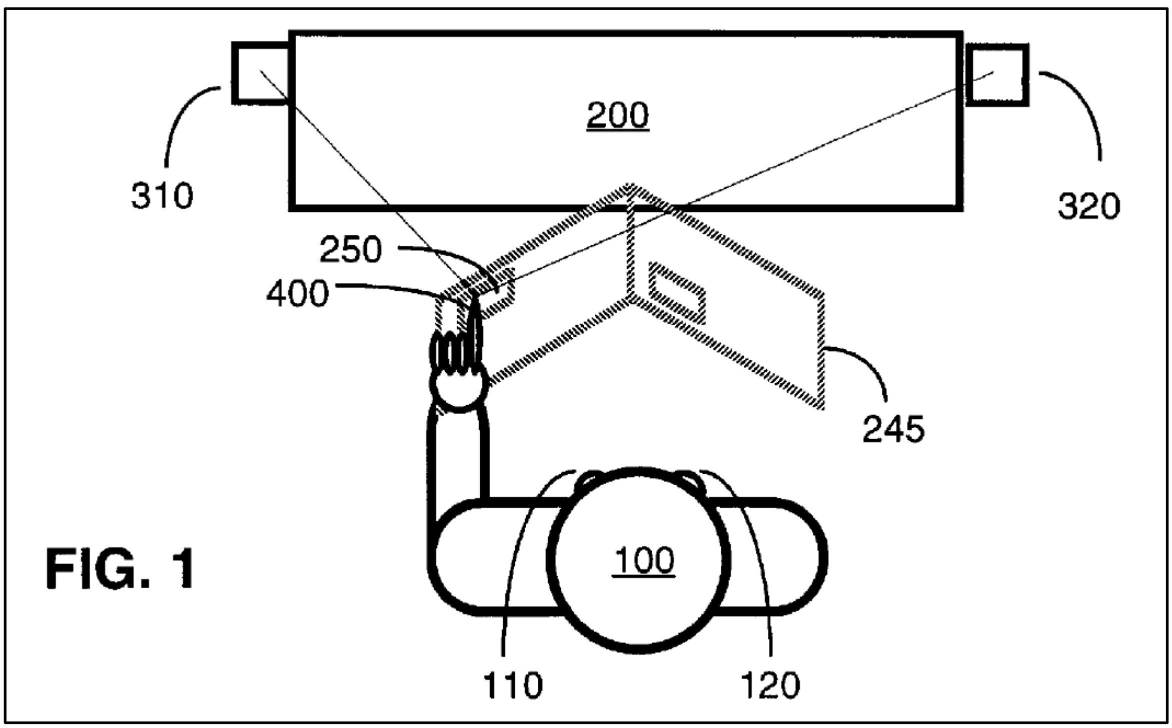
interact with a program by projecting the application into a three-dimensional space. *Bederson Dec.* (Ex. 1010), ¶¶ 63-64 (discussing the improvements over two-dimensional displays outlined by *DeLuca* (Ex. 1006), 1:11-2:5, and concluding that the three-dimensional gesturing and pointing contemplated by *Numazaki's* eighth embodiment would have been more intuitive if implemented in a three-dimensional projection of the application as described in *DeLuca*); *see also KSR*, 550 U.S. at 417 (obvious to use known techniques to improve similar devices in the same way). Second, a PHOSITA would have anticipated success in modifying *Numazaki* in this manner based at least on the similarities in functionality and structure between *Numazaki* and *DeLuca*. *Bederson Dec.* (Ex. 1010), ¶ 65 (describing the similarities between *Numazaki* and *DeLuca* and concluding the described modification would have been well within the skill set of a PHOSITA); *see also KSR*, 550 U.S. at 416 (obvious to combine prior art elements according to known methods to yield predictable results). Indeed, *Numazaki* already contemplates detecting a user's hand in three dimensions. *Numazaki* (Ex. 1004), 16:39-44 (noting that "it is possible to extract a 3D shape of . . . [a] hand," that "it is possible to detect an inclination of the palm of the hand, which appears as a partially different distances[,]" and that "when the hand is moved, the change of the pixel values can be regarded as a change of the distance"). So much of the modification would simply be incorporating the three-

dimensional projection technology from *DeLuca* into the laptop arrangement described in *Numazaki's* eighth embodiment. *Bederson Dec.* (Ex. 1010), ¶ 65.

xvi. Claim 16

16. The computer apparatus of claim 12 wherein the display includes a three-dimensional display.

In Figures 1 and 5, *DeLuca* teaches a physical object, such as a fingertip 400, may be used to touch an icon 250, which is part of stereoscopically projected object 245. *DeLuca* (Ex. 1006), 2:44-51, 4:9-10. Cameras 310 and 320 determine the position and orientation of the fingertip. *Id.* at 5:22-43.



Id. at Fig. 1.

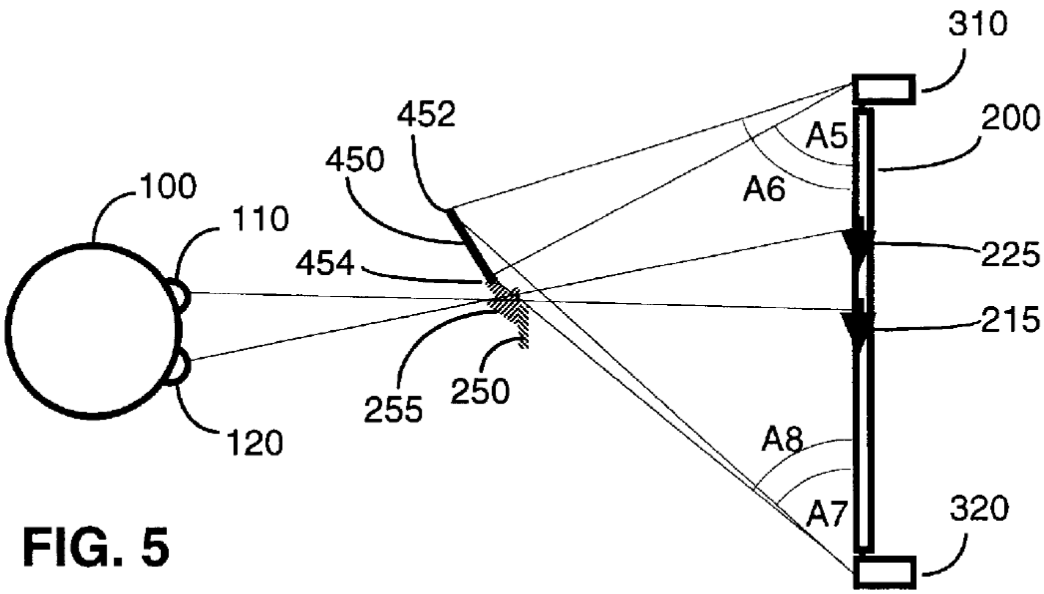


FIG. 5

Id. at Fig. 5. By example, this enables a user to activate a "word processing program . . . when the user's finger moves within the [3D] space to touch the projected icon" that is a "W" representing the word processing program. *Id.*at Abstract.

xxix. Claim 29

29. The method according to claim 21 further including providing a three-dimensional display viewable by the user.

See Claim 16, *supra.*

D. Ground 4: Claim 18 is obvious under pre-AIA 35 U.S.C. § 103 over *Numazaki* in view of *DeLeeuw*

Overview of DeLeeuw

U.S. Patent No. 6,088,018 to DeLeeuw, et al. (*"DeLeeuw"*) (Ex. 1007) was filed on June 11, 1998 and is prior art to the '079 Patent under at least 35 U.S.C. § 102(e) (pre-AIA). *DeLeeuw* was not cited or considered during prosecution of the

’079 Patent or its parent, U.S. Patent No. 6,750,848. *’079 Patent* (Ex. 1001); *’848 Patent* (Ex. 1003).

DeLeeuw discloses a “method of providing input signals to a system having a display” by capturing an object via video. *DeLeeuw* (Ex. 1007), 1:37-45. In a typical setup, the “video camera is pointed toward the user,” whom “may see a reflected image of himself or herself on the computer screen” yet still “see and interact with other display elements such as desktop icons or application program displays” because the reflected image is displayed transparently. *Id.* at 2:55-60. The result appears in Figure 1:

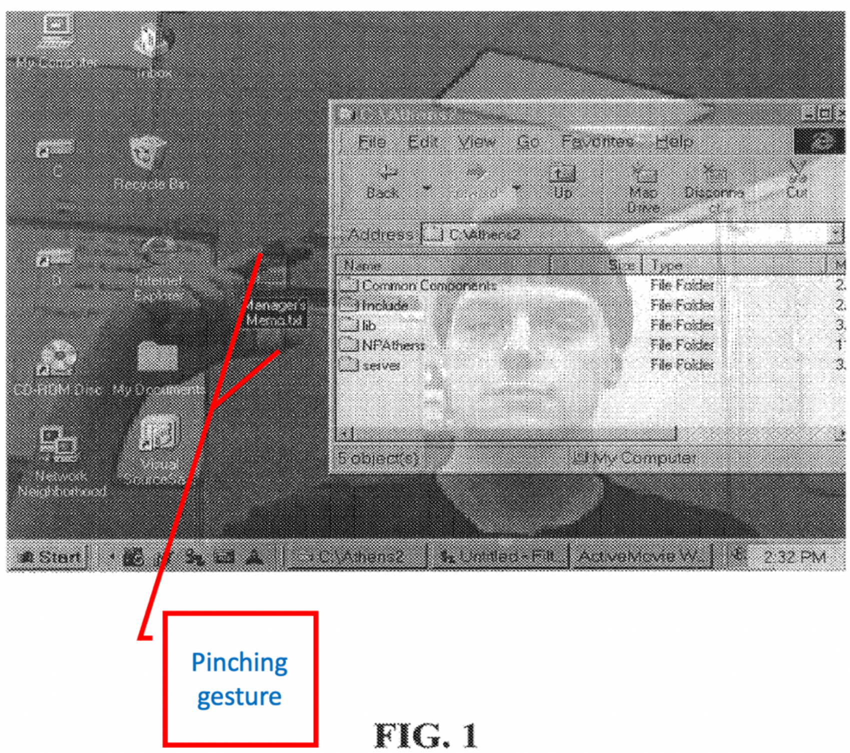


FIG. 1

Id. at Fig. 1 (annotated to show pinching gesture). Using this "video reflection," the user may interact with a computer system's graphical user interface by "physically moving real objects (such as the user's hands and fingers, for example) that are in the field of view of the video camera." *Id.* at 3:6-11.

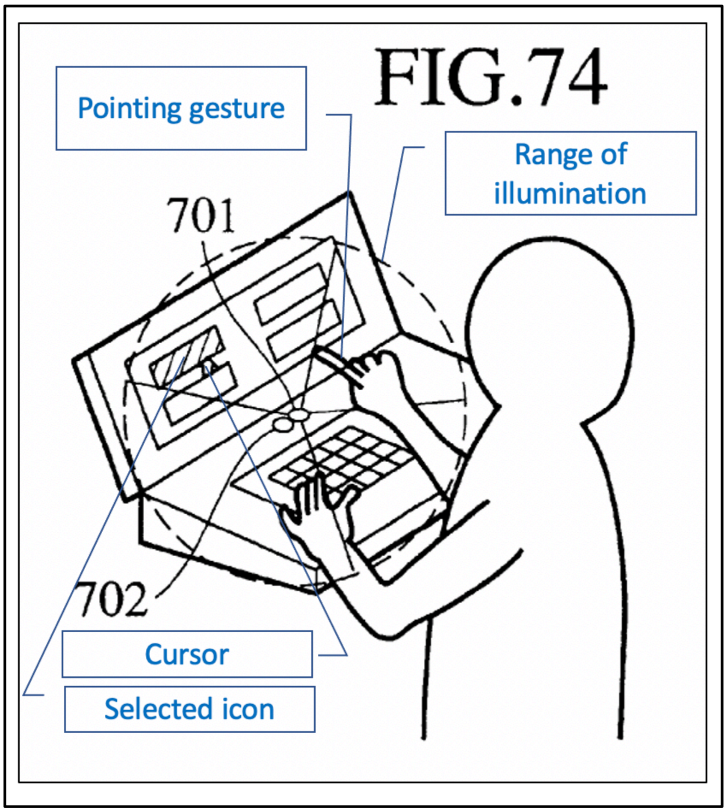
One embodiment uses pixel colors in the video data to "track the movement of real objects such as a user's hands" to "be recognized as input event generators" where a cursor can be moved when "the user 'pinches' his or her index finger and thumb" to input a "mouse down event," the release of which creates a "mouse up event." *Id.* at 3:54-4:7.

Because *DeLeeuw,* like the '079 Patent, discloses a method and apparatus for generating computer input information by capturing hand gestures, *DeLeeuw* is in the same field of endeavor as the '079 Patent. *Compare DeLeeuw* (Ex. 1007), 3:26-4:4 (describing how "video data signals" capture the "movement of a user's index finger and thumb" together and display it as a "reflected image") w*ith '079 Patent* (Ex 1001), Abstract (describing "a method for determining a gesture illuminated by a light source" that "utilizes the light source to provide illumination through a work volume above the light source" where a "camera is positioned to observe and determine the gesture performed in the work volume").

DeLeeuw is therefore analogous art to the '079 Patent. *Bederson Dec*. (Ex. 1010), ¶¶ 66-67.

Motivation to Modify Numazaki in view of DeLeeuw

In an eighth embodiment, *Numazaki* detects pointing gestures within a "range of illumination" cast by a lighting unit 701 and captured by a camera 702 to select and move icons on a screen. *Numazaki* (Ex. 1004), 50:25-48. *Numazaki* depicts this configuration in Figure 74:



Id. at Fig. 74 (annotated to illustrate a portable computer configuration capturing a pointing gesture within a range of illumination to select an icon by manipulating a cursor). Although *Numazaki* detects "pointing or gesture input" and expressly contemplates "operations such as click and drag for selecting and moving icons," the eighth embodiment does not explicitly disclose detecting a pinching gesture for

icon manipulation. *Id.* at 50:38-48. A PHOSITA would, however, have been motivated to implement *Numazaki's* eighth embodiment such that a user could manipulate icons using a pinch gesture as disclosed in *DeLeeuw*. *Bederson Dec.* (Ex. 1010), ¶ 68. First, allowing users to perform a pinch gesture in order to manipulate icons is one of a finite number of identified and predictable solutions for icon manipulation. *Id.* at ¶ 68 (noting that *DeLeeuw* expressly teaches pinch gestures in the context of icon manipulation and concluding that such a gesture is an intuitive means of allowing users to select and move an item within an application); *see also KSR*, 550 U.S. at 421. Second, a PHOSITA would have anticipated success in modifying *Numazaki* in this manner given that *Numazaki* already includes the technical hardware and programming necessary to detect gestures comprising multiple fingers. *Bederson Dec.* (Ex. 1010), ¶ 69 (discussing *Numazaki* at 38:43-49, which discloses identifying hand gestures, including a state of two extended fingers similar to that necessary to implement a pinch, and concluding that a PHOSITA would be able to easily incorporate *DeLeeuw's* pinch gesture into *Numazaki's* eighth embodiment with minimal changes to the existing programming); *see also KSR*, 550 U.S. at 416 (obvious to combine prior art elements according to known methods to yield predictable results).

xviii. Claim 18

18. The computer apparatus of claim 11 wherein the determined gesture includes a pinch gesture.

As described above regarding the motivation to combine *Numazaki* and *DeLeeuw, DeLeeuw* teaches a computer gesture-detection system that uses a camera like that in *Numazaki* to expressly detect a pinching gesture. *DeLeeuw's* system captures video images using a "video camera coupled to a PC" subsequently "rendered to the entire screen of the PC's display." *DeLeeuw* (Ex. 1007), 2:46-50. The "video camera is pointed toward the user," whom "may see a reflected image of himself or herself on the computer screen" yet still "see and interact with other display elements such as desktop icons or application program displays" because the reflected image is displayed transparently. *Id.* at 2:55-61. The result appears in Figure 1:

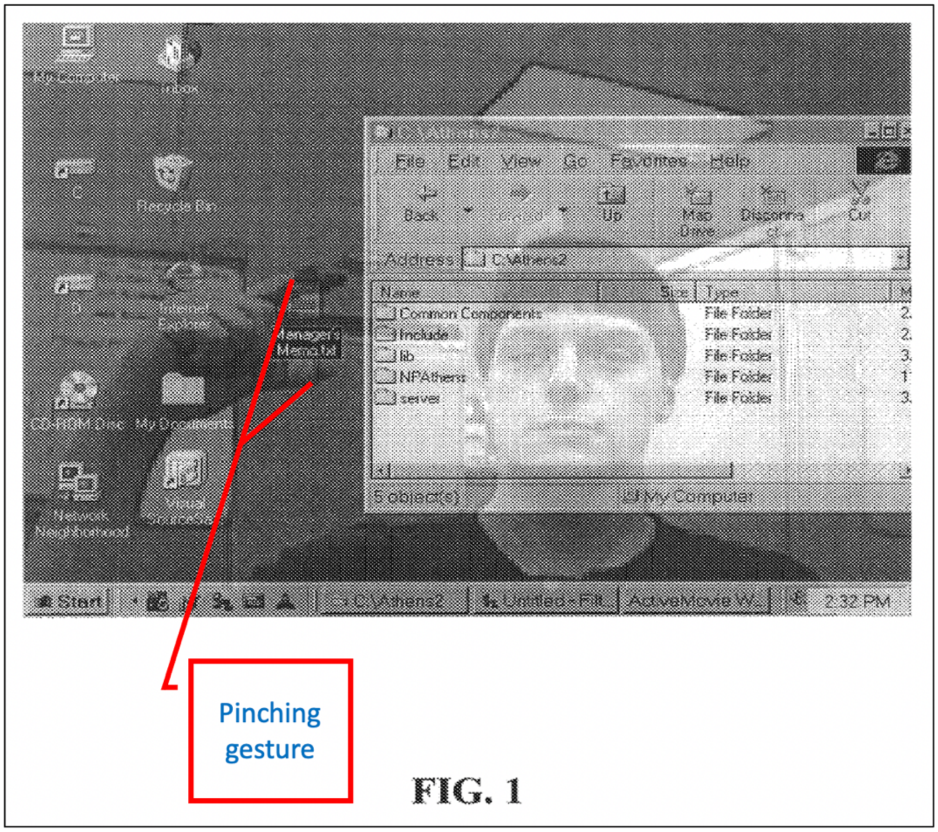


FIG. 1

Id. at Fig. 1 (annotate to show pinching gesture). This "video reflection" allows a user to interact with a computer system's graphical user interface by "physically moving real objects (such as the user's hands and fingers, for example) that are in the field of view of the video camera." *Id.* at 3:6-11. Specifically, a cursor can be moved when "the user 'pinches' his or her index finger and thumb" to input a "mouse down event," the release of which creates a "mouse up event." *Id.* at 3:54-4:7.

E. Ground 5: Claim 20 is obvious under pre-AIA 34 U.S.C. § 103 over *Numazaki* in view of *Maruno*

Overview of Maruno

U.S. Patent No. 6,191,773 to Maruno, et al. (*"Maruno"*) (Ex. 1008) was filed as an international application and received national stage entry into the United

States on January 2, 1998 per U.S.C. § 371(c) and therefore qualifies as prior art to the '079 Patent under 35 U.S.C. § 102(e). *Maruno* was not cited or considered during prosecution of the '079 Patent or its parent, U.S. Patent No. 6,750,848. *'079 Patent* (Ex. 1001); *'848 Patent* (Ex. 1003).

Maruno teaches an "interface apparatus" for recognizing the shape of a hand of an operator, displaying that "special shape" on a screen as a cursor, and manipulating that cursor by detecting the variance of hand shape. *Maruno* (Ex. 1008), 1:46-2:15. In a fourth embodiment, *Maruno* teaches a configuration for "manipulation of a virtual three-dimensional image shown on a two-dimensional display screen" by "**grasp[ing]** a virtual object in a virtual space by using a cursor . . . displayed [in a] three-dimensional space." *Id.* at 11:17-24 (emphasis added).

The shape and movement of an operator's hand are captured and read using a camera. *Id.* at 15:35-36. As illustrated below, *Maruno* establishes hand positioning by converting luminance data from the pixels into coordinate-based binary data for establishing position, distance, and center of gravity dimensions of the hand. *Id.* at 15:38-46. The shape of the hand, *i.e.,* its open or closed position, is determined by comparing the ratio of the sides of a rectangle surrounding the hand (e.g., short vertical sides to a long top side indicates closed and long vertical sides relative to the same top side indicates an open hand). *Id.* at 15:42-44.

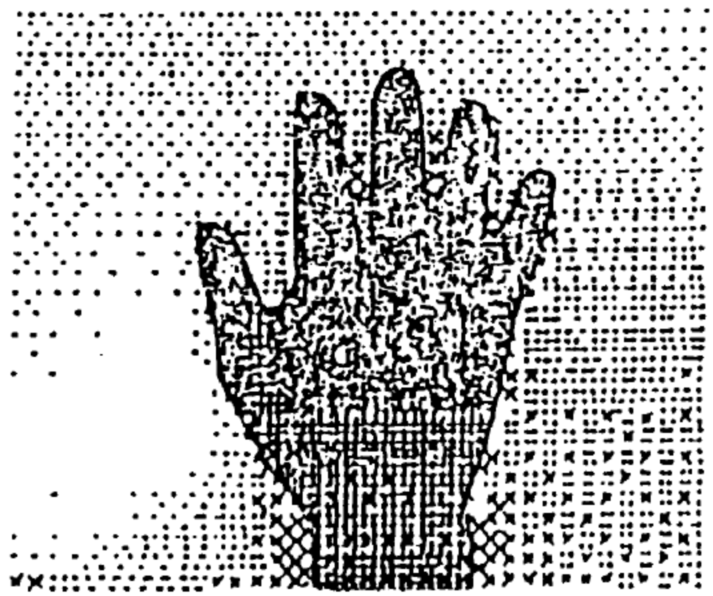


FIG. 28(A)

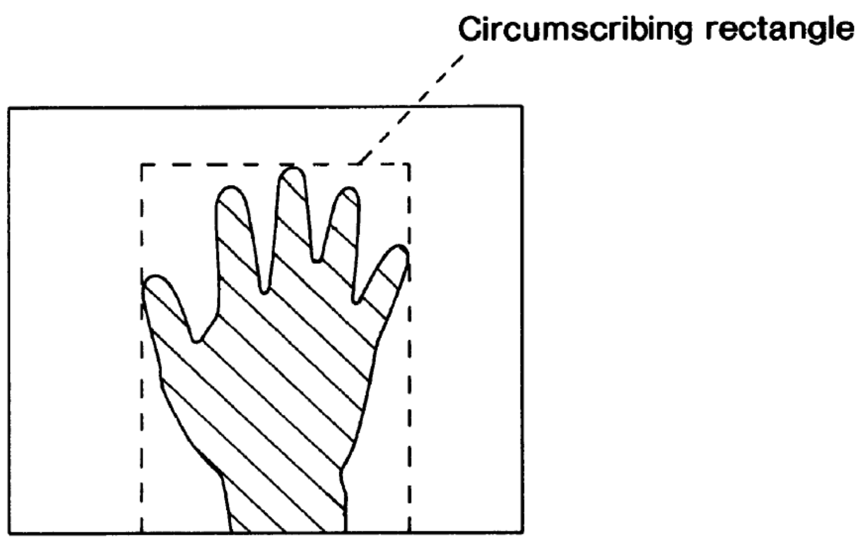
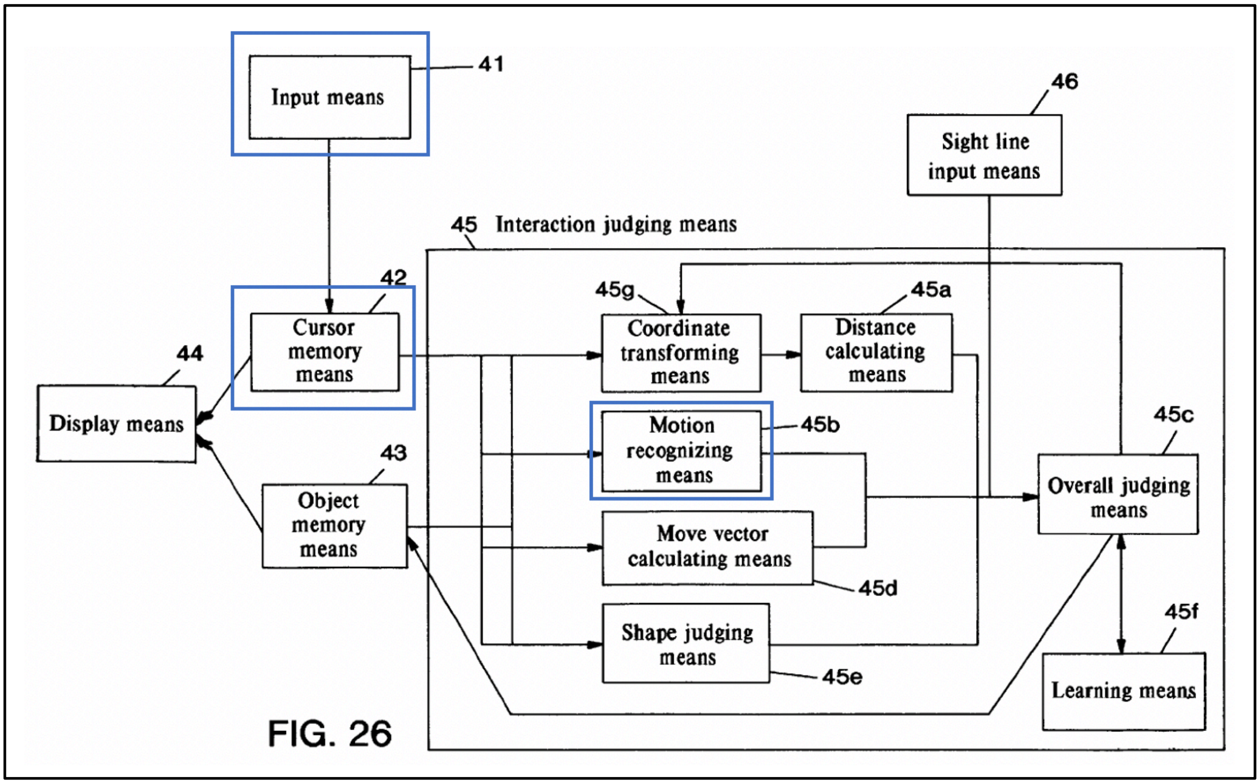


FIG. 28(B)

Id. at Figs. 28(a-b). Thus, "[m]anipulation of the operator is effected on the input means 41," which may be a camera. *Id.* 15:21-24. The input means "sends the

manipulation data (cursor moving distance, cursor shape changing amount, etc.) to the cursor memory means 42" depicted below. *Id.* at 15:46-48.



Id. at Fig. 26 (figure annotated to emphasize functional blocks for determining hand grasp).

The cursory memory means "changes and stores the coordinates and shape of [the] representative point representing the position in the virtual space of the cursor" and uses those coordinates to display the cursor in two- or three-dimensional space. *Id.* at 14:19-30. The cursor itself may be displayed in the special shape of a hand that opens and closes. *Id.* at 2:16-20, 15:8-11.

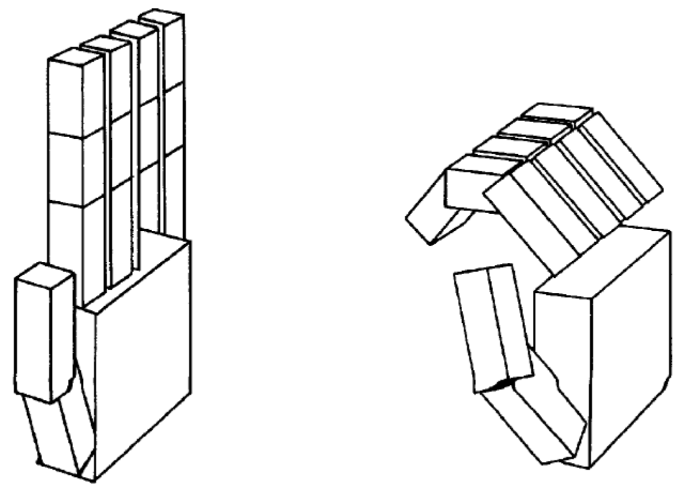


FIG. 22(E) FIG. 22(F)

Id. at Figs. 22(e-f).

Cursory memory means 42 of Fig. 26, *supra,* then provides the image-sourced data to an "interaction judging means 45" which "**judges if the cursor has grabbed**[5] [a virtual] object or not (presence or absence of interaction) every time the cursor position changes." *Id.* at 16:18-20 (emphasis added). Specifically, *Maruno's* "motion recognizing means 45(b) recognizes the motion of 'grab' as the preliminarily registered motion by using the change of shape of the cursor." *Id.* at

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[5]A PHOSITA would have considered a grab motion to be the same as a grip motion. *Bederson Dec.* (Ex. 1010), ¶ 73 (explaining that grab and grip are synonymous in the context of gesture-based control of a virtual object).

16:30-32. As illustrated in Figure 25, "**the action of grabbing by the operator** may be instructed to the input means 1, and when the motion recognizing means 45b **recognizes the grabbing action**, the virtual object may be grabbed and moved." *Id.* at 18:20-26 (emphasis added).

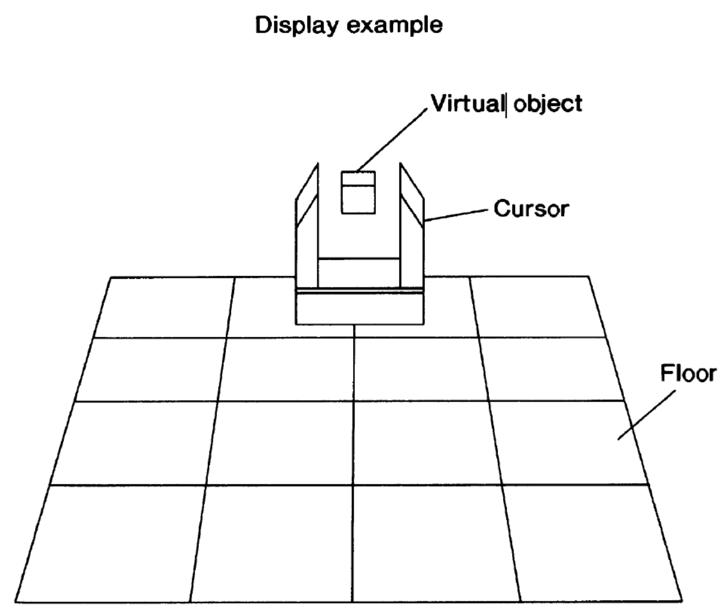


FIG. 25

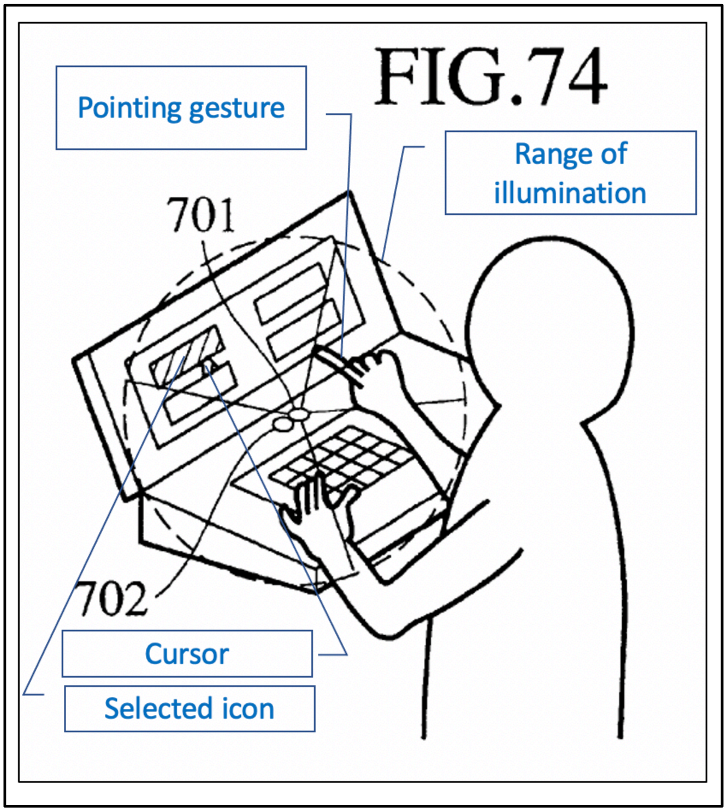
Id. at Fig. 25.

Because *Maruno,* like the '079 Patent, discloses a method and apparatus for generating computer input information by capturing hand gestures, *Maruno* is in the same field of endeavor as the '079 Patent. *Compare Maruno* (Ex. 1008), 1:46-55, 15:34-36 ("the invention provides an interface apparatus comprising recognizing means for recognizing the shape of a hand of an operator . . . whereby the information displayed in the screen can be controlled only by varying the shape of the hand" and

"[w]hen using a camera . . . the shape and position of the hand are read") *with '079 Patent* (Ex 1001), Abstract (describing "[a] method for determining a gesture illuminated by a light source" that "utilizes the light source to provide illumination through a work volume above the light source" where a "camera is positioned to observe and determine the gesture performed in the work volume"). *Maruno* is therefore analogous art to the '079 Patent. *Bederson Dec.* (Ex. 1010), ¶¶ 70-74.

Motivation to Combine *Numazaki* and *Maruno*

In an eighth embodiment, *Numazaki* detects pointing gestures within a "range of illumination" cast by a lighting unit 701 and captured by a camera 702 to select and move icons on a screen. *Numazaki* (Ex. 1004), 50:25-48. *Numazaki* depicts this configuration in Figure 74:



Id. at Fig. 74 (annotated to illustrate a portable computer configuration capturing a pointing gesture within a range of illumination to select an icon by manipulating a cursor). Although *Numazaki* detects "pointing or gesture input" and expressly contemplates "operations such as click and drag for selecting and moving icons," the eighth embodiment does not explicitly disclose detecting a grip gesture for icon manipulation. *Id.* at 50:38-48. A PHOSITA would, however, have been motivated to implement *Numazaki's* eighth embodiment such that a user could manipulate icons using a grip gesture as disclosed in *Maruno*. *Bederson Dec.* (Ex. 1010), ¶¶ 75-76. First, allowing users to perform a grip gesture in order to manipulate icons is one of a finite number of identified and predictable solutions for icon manipulation. *Id.*

at ¶¶ 75-76 (noting that *Maruno* expressly teaches grip gestures in the context of icon manipulation and concluding that such a gesture is an intuitive means of allowing users to select and move an item within an application); *see also KSR*, 550 U.S. at 421. Second, a PHOSITA would have anticipated success in modifying *Numazaki* in this manner given that *Numazaki* already includes the technical hardware and programming necessary to detect gestures comprising a closed hand. *Bederson Dec.* (Ex. 1010), ¶ 77 (discussing *Numazaki* at 38:43-49, which discloses identifying hand gestures, including a state of no fingers extended similar to that necessary to implement a grip, and concluding that a PHOSITA would be able to easily incorporate *Maruno's* grip gesture into *Numazaki's* eighth embodiment with minimal changes to the existing programming); *see also KSR*, 550 U.S. at 416 (obvious to combine prior art elements according to known methods to yield predictable results).

xx. Claim 20

20. The computer apparatus of claim 11 wherein the determined gesture includes a grip gesture.

Maruno teaches a configuration for "manipulation of a virtual three-dimensional image shown on a two-dimensional display screen" by "**grasp[ing]** a virtual object in a virtual space by using a cursor . . . displayed [in a] three-dimensional space." *Maruno* (Ex. 1008), 11:17-24 (emphasis added). As noted above, the shape and movement of an operator's hand are captured and read using a

camera. *Id.* at 15:35-36. As illustrated below, *Maruno* establishes hand positioning by converting luminance data from the pixels into coordinate-based binary data for establishing position, distance, and center of gravity dimensions of the hand. *Id.* at 15:38-46. The shape of the hand, *i.e.,* its open or closed position, is determined by comparing the ratio of the sides of a rectangle surrounding the hand (*e.g.,* short vertical sides to a long top side indicates closed; long vertical sides relative to the same top side indicates an open hand). *Id.* at 15:42-44.

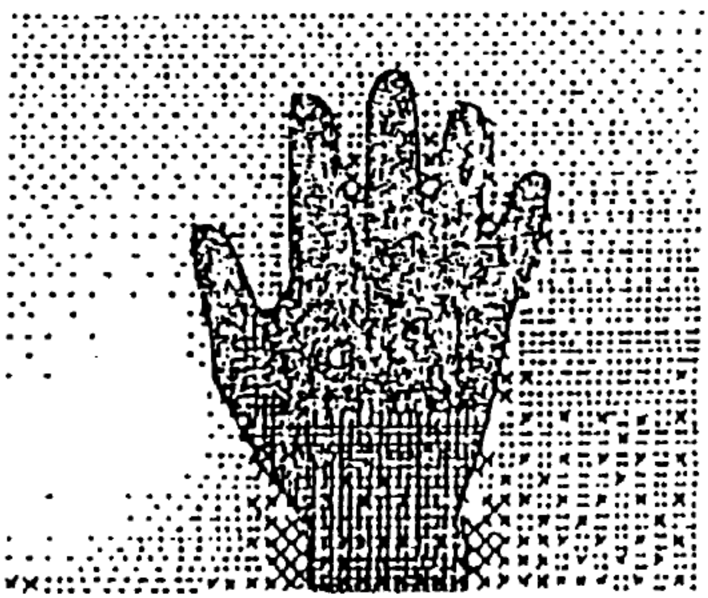


FIG. 28(A)

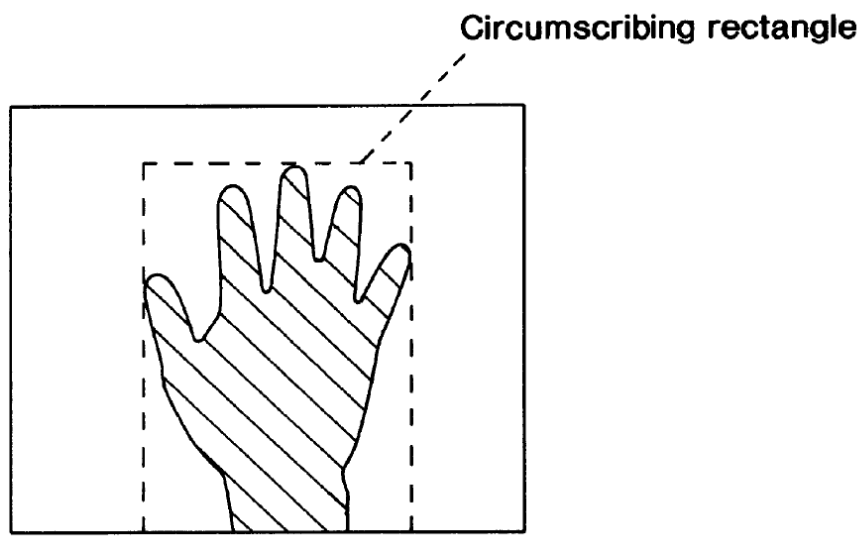
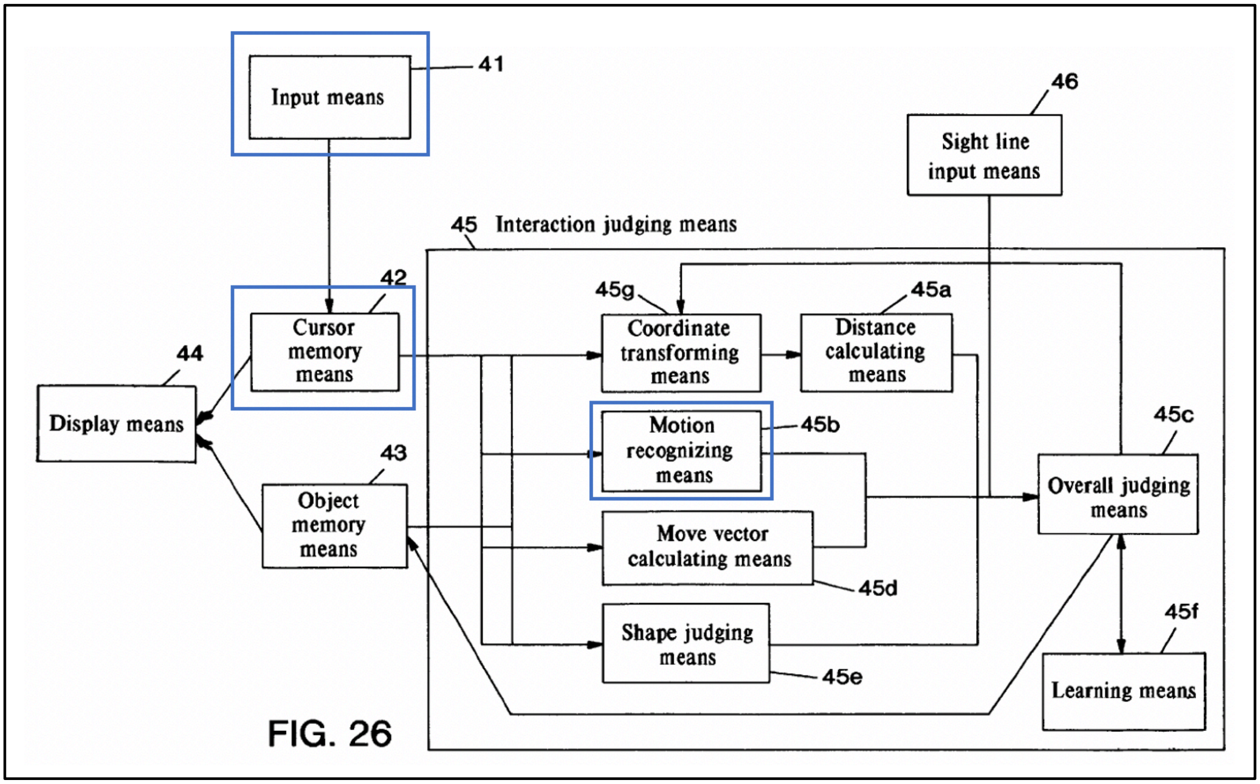


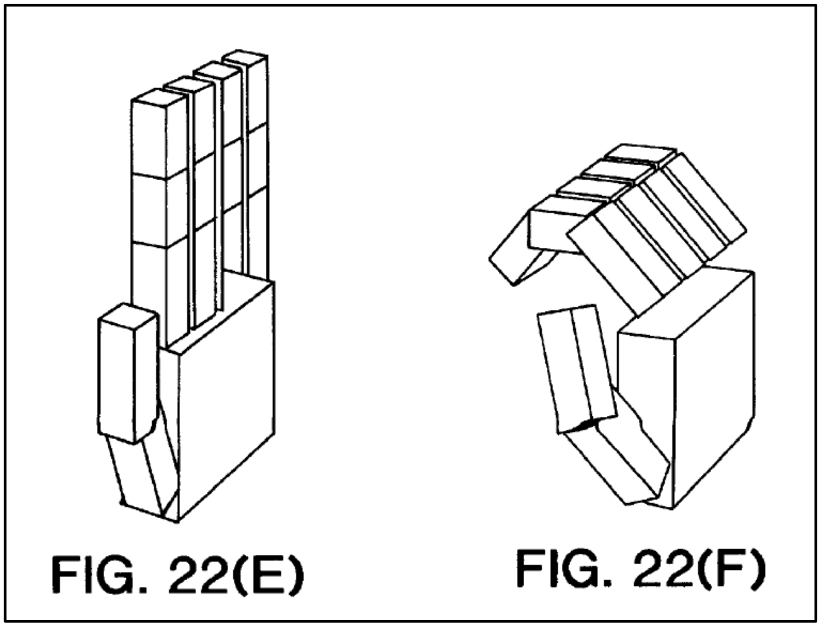
FIG. 28(B)

Id. at Figs. 28(a-b). Thus, "[m]anipulation of the operator is effected on the input means 41" which may be a "camera." *Id.* 15:21-24. The camera, as input means 41, then "sends the manipulation data (cursor moving distance, cursor shape changing amount, etc.) to the cursor memory means 42" depicted below. *Id.* at 15: 46-48.



Id. at Fig. 26 (figure annotated to emphasize functional blocks for determining hand grasp).

The cursory memory means "changes and stores the coordinates and shape of [the] representative point representing the position in the virtual space of the cursor" and uses those coordinates to display the cursor in two- or three-dimensional space. *Id.* at 14:19-30. The cursor itself may be displayed as a hand that opens and closes. *Id.* at 15:8-11.



Id. at Figs. 22(e-f).

Cursory memory means 42 of Fig. 26, *supra,* then provides the image-sourced data to an "interaction judging means 45" which "**judges if the cursor has grabbed** [a virtual] object or not (presence or absence of interaction) every time the cursor position changes." *Id.* at 16:18-20 (emphasis added). Specifically, *Maruno's* "motion recognizing means 45(b) recognizes the motion of "grab" as the preliminarily registered motion by using the change of shape of the cursor." *Id.* at 16:30-34. As illustrated in Figure 25, "the action of grabbing by the operator may be instructed to the input means 1, and when the motion recognizing means 45b recognizes the grabbing action, the virtual object may be grabbed and moved." *Id.* at 18:20-26.

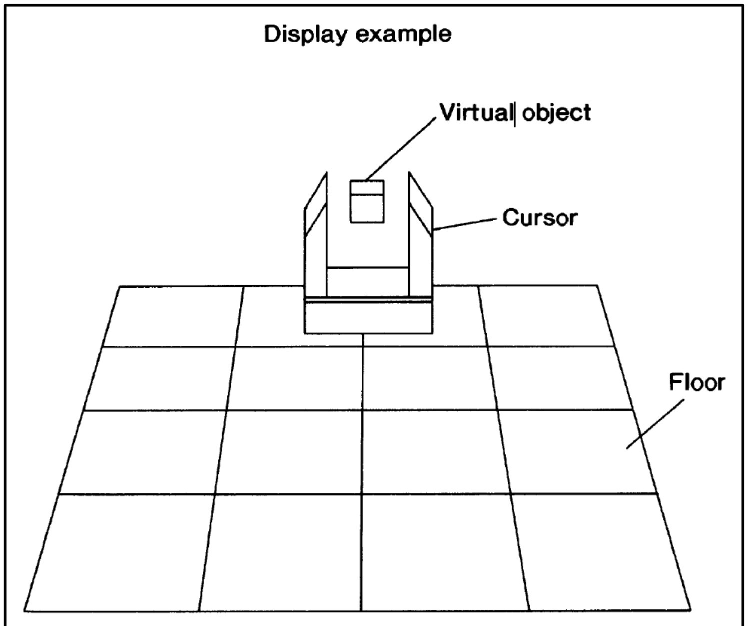


FIG. 25

Id. at Fig. 25.

V. DISCRETIONARY CONSIDERATIONS

A. The *Fintiv* Factors Favor Institution

Under the "*Fintiv* factors," the Board has asserted that it may consider parallel litigation, including an early trial date, in determining whether to institute under 35 U.S.C. § 314(a). *NHK Spring Co., Ltd., v. Intri-Plex Technologies, Inc.*, IPR2018-00752, Paper 8 at 19–20 (PTAB Sept. 12, 2018) (precedential); *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 2–3, 6 (PTAB Mar. 20, 2020) (enumerating six factors that "relate to whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in [a] parallel proceeding") (precedential). Those factors favor institution here.

a. The *Fintiv* factors strongly favor institution

1. Whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted.

The litigation in the Western District of Texas has just begun. Neither party has requested a stay yet, though Petitioner intends to do so if institution is granted. Petitioner has acted expeditiously in filing this Petition since the district court litigation began. Accordingly, this factor should favor institution. At worst, this factor is neutral because the Board "will not attempt to predict" how the district court will proceed. *Sand Revolution II, LLC v. Continental Intermodal Group-Trucking LLC*, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative).

2. Proximity of the court's trial date to the Board's projected statutory deadline for a final written decision.

Although no trial date has been set, the projected trial date in the Texas Litigation should be scheduled in early 2023 or later.[6] The trial therefore is expected to occur *after* the expected final written decision (FWD). "This factor looks at the

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[6] A recent Order Governing Proceedings in patent cases issued by Judge Alan D. Albright proposes a *Markman* hearing 23 weeks after the Case Management Conference ("CMC") and trial 52 weeks after *Markman*. Ex. 1009 at 8, 10. Here, no CMC has been scheduled, and Petitioner does not anticipate a CMC in the coming months.

proximity of the trial date to the date of [FWD] to assess the weight to be accorded a trial date set earlier than the expected [FWD] date." IPR2020-00944, Paper 20, 61. As recognized by the Board, where "there is at least some persuasive evidence that delays are possible," trial dates upward of six months before the FWD are insufficient to deny institution. *Id*. Here, the law and facts support the same conclusion.

As the Federal Circuit explained in *In re Apple*, "a court's general ability to set a fast-paced schedule is not particularly relevant," especially where "the forum [i.e., W.D. Tex.] itself has not historically resolved cases so quickly." *In re Apple Inc*., No 20-135, slip op. at 16 (Fed. Cir. Nov. 9, 2020) (Ex. 1012); *see* IPR2020-01280, Paper 17, 13-16. Indeed, the Federal Circuit found error in reliance on the case's scheduled trial date. *In re Apple Inc*., No 20-135, slip op. at 15. Similarly, adhering to the Federal Circuit's guidance, it would be error for the Board to rely upon the current schedule. And, if the Board instead projects the trial date using the WDTX's average time to trial—which itself leaves the Board to error-prone speculation as to the timing of this particular trial—that speculated trial date is (at best) concurrent with the timing of the final written decision. *Id.*

Notably, here, concerns over speculation transcend the legal error noted by the Federal Circuit, as averages are inherently unreliable in resolving trial dates. This is evident from statistics concerning strikingly frequent trial slippage in WDTX.

"70% of [WDTX] trial dates initially relied upon by the PTAB to deny petitions have slid," as of July 2020. District Court Trial Dates Tend to Slip After PTAB Discretionary Denials (Ex. 1013). Such delays even impacted the seminal *NHK* and *Fintiv* cases, where, after the Board denied institution, associated trial dates were delayed to after the expected FWD dates by the courts—the same WDTX court in *Fintiv* as is handling the Texas Litigation. *See* IPR2018-01680, Paper 22 at 17, n. 6 (PTAB Apr. 3, 2019) ("In the district court case running parallel to *NHK Spring*, the court ultimately moved the trial date back six months, illustrating the uncertainty associated with litigation schedules."); Order Resetting *Fintiv* Jury Trial (Ex. 1014) (resetting *Fintiv* trial to October 4, 2021, nearly five months after the FWD would have been due in the associated IPR). In contrast, despite the pandemic, the Board has adhered to the one-year statutory deadline for FWDs prescribed by 35 U.S.C. § 316(a)(11).

3. Investment in the parallel proceeding by the court and the parties.

The parties have invested little in the parallel proceeding. No infringement or invalidity contentions have been exchanged, no claim construction positions have been taken, and no discovery has been conducted. This factor weighs in favor of institution.

4. Overlap between issues raised in the petition and in the parallel proceeding.

No invalidity contentions have been served in the district court litigation, so there is presently no overlap. This factor weights in favor of institution.

5. *Whether* the petitioner and the defendant in the parallel proceeding are the same party.

The parties are the same in the district court litigation. However, members of the Board have noted that *Fintiv* addresses only the scenario in which the petitioner is unrelated to a defendant in a parallel proceeding, finding this should weigh against denying institution, but that *Fintiv* "says nothing about situations in which the petitioner is the same as, or is related to, the district court defendant." *Cisco Sys., Inc. v. Ramot at Tel Aviv Univ. Ltd.*, IPR2020-00122, Paper 15, at *10 (PTAB May 15, 2020) (APJ Crumbley, dissenting) (noting that disfavoring a "defendant in the district court" is "contrary to the goal of providing district court litigants an alternative venue to resolve questions of patentability").

6. Other circumstances that impact the Board's exercise of discretion, including the merits.

As set forth above, the strength of the proposed grounds weighs strongly in favor of institution.

Additionally, the *Fintiv* factors require the Board to take "a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Fintiv*, Paper 11 at 6. Denying institution here is both inefficient

and would raise significant concerns about the patent system's integrity. Were the Board to deny institution, years of district court litigation would be required just to obtain a finding of invalidity. Such a scenario runs directly counter to *Fintiv's* goals of preserving efficiency and the system's integrity.

In sum, denying institution here creates vast inefficiencies, forcing the parties to litigate for potentially years in the district court and harms system integrity by rejecting the PTAB as the "lead agency" in assessing patentability. The Board should decline to exercise its discretion for these additional reasons.

b. The *Fintiv* Framework Should Be Overturned

Apart from Petitioner's showing that the *Fintiv* factors favor institution, the *Fintiv* framework should be overturned because it is both legally invalid and unwise policy. Specifically, the framework (1) exceeds the Director's authority, (2) is arbitrary and capricious, (3) and was adopted without notice-and-comment rulemaking.

1. The *Fintiv* framework exceeds the Director's authority

Under the America Invents Act ("AIA"), the Director has no authority to deny IPR petitions based on parallel infringement litigation if the IPR petition was timely under § 315(b). Section 314(a) permits the Director to determine whether "there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged." That phrasing is not an invitation to create grounds for

denying institution that conflict with other aspects of the statute. Accordingly, even assuming § 314(a) gives the Director a degree of discretion to deny institution, he cannot exercise that discretion in a manner that violates or exceeds his authority under the AIA. And the AIA's text, structure, and purpose show that Congress withheld the authority to deny institution based on parallel infringement litigation.

For example, § 315(b) makes clear that IPR is permissible when parallel litigation is pending if the petition is timely. Because statutorily defined time limitations inherently "take[] account of delay," other "case-specific circumstances"—like the *Fintiv* factors—"cannot be invoked to preclude adjudication of a claim … brought within the [statutory] window." *Petrella v. Metro-Goldwyn-Mayer, Inc.*, 572 U.S. 663, 667, 677-680, 685 (2014).

The AIA's structure confirms that the Director lacks authority to adopt and apply the *Fintiv* framework. Various provisions specify how the Director may or must handle parallel proceedings, showing that Congress carefully considered how to promote both efficiency and the purposes of IPR in the face of parallel proceedings and intended for IPR to be available even when parallel infringement litigation is pending if the IPR petition is timely. *See, e.g.*, §§ 315(a), (d), 325(d). But none of those provisions grants the Director discretion to reject IPR because there is a parallel lawsuit. Thus, Congress "knew how to draft the kind of statutory language that [the Director] seeks to read into" the AIA. *State Farm Fire & Cas. Co.*

v. United States ex rel. Rigsby, 137 S. Ct. 436, 443-444 (2016). "[H]ad Congress intended to" grant the Director the discretion he has asserted in the *NHK-Fintiv* framework, Congress "would have said so." *Id.*

Finally, by treating overlap as a reason to deny institution, the *Fintiv* framework contravenes a central purpose of IPR, namely, providing a more efficient additional pathway for resolving the same issues that the challenger could otherwise have brought only in litigation. *See* H.R. Rep. No. 98, at 48, 112th Cong., 1st Sess. (2011); *Thryv, Inc. v. Click-To-Call Techs., LP*, 140 S. Ct. 1367, 1374-1375 (2020).

2. The *Fintiv* framework is arbitrary and capricious

The *Fintiv* framework is arbitrary and capricious, and therefore unlawful, in several respects. First, the framework requires the Board to make decisions based on speculation about the course of parallel litigation, producing irrational outcomes and disparities between similarly situated IPR petitioners. *See, e.g.*, *Horsehead Resource Dev. Co. v. Browner*, 16 F.3d 1246, 1269 (D.C. Cir. 1994) ("agency actions based upon speculation are arbitrary and capricious"). Second, the *NHK-Fintiv* factors are so vague and malleable that they lead the Board to "treat similar situations differently without reasoned explanation"—a hallmark of arbitrary and capricious agency action. *Port of Seattle v. FERC*, 499 F.3d 1016, 1034 (9th Cir. 2007). And third, the *NHK-Fintiv* framework is not rationally connected to its ostensible purpose of promoting efficiency. On the contrary, the rule undermines that goal by, for example,

pressuring infringement defendants to file premature IPR petitions and allowing infringement plaintiffs to block IPR entirely through forum shopping.

3. The *Fintiv* framework was impermissibly adopted without notice-and-comment rulemaking

The *Fintiv* framework is also invalid because it is a rule that was impermissibly adopted without notice-and-comment rulemaking. Through the Director's designation of *NHK* and *Fintiv* as precedential, those decisions' framework became "binding" on the Board "in subsequent matters involving similar facts or issues," Patent Trial and Appeal Board, Standard Operating Procedure 2 (Rev. 10) ("SOP-2"), at 11 (Sept. 20, 2018)—that is, they became a "rule" as defined in the Administrative Procedure Act ("APA"), *see* 5 U.S.C. § 551(4) (defining "rule"). But that designation process did not entail public notice and an opportunity or public comment, *see* SOP-2 at 1-4, 8-12; *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1331-1332 (Fed. Cir. 2017) (Moore, J., concurring), contrary to the requirements of both the APA and the AIA. *See Kisor v. Wilkie*, 139 S. Ct. 2400, 2420 (2019); §§ 2(b)(2), 316(a).

VI. CONCLUSION

For the forgoing reasons, Petitioner respectfully requests *inter partes* review of claims 1–30 of the '079 Patent.

Respectfully submitted,
By: /s/ Adam P. Seitz
Adam P. Seitz, Reg. No. 52,206
Paul R. Hart, Reg. No. 59,646

COUNSEL FOR PETITIONER

VII. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(A)(1)

A. Real Party-In-Interest

Petitioner is the real party-in-interest. 37 C.F.R. § 42.8(b)(1).

B. Related Matters

Pursuant to 37 C.F.R. § 42.8(b)(2), Petitioner is aware of the following matters involving the '079 Patent: *Gesture Technology Partners, LLC v. Apple Inc.*, No. 6:21-cv-00121 (W.D. Tex.); *Gesture Technology Partners, LLC v. Lenovo Group Ltd. et al.,* No. 6:21-cv-00122 (W.D. Tex.); *Gesture Technology Partners, LLC v. LG Electronics, Inc. et al.,* No. 6:21-cv-00123 (W.D. Tex.).

C. Lead and Back-Up Counsel

Petitioner provides the following designation and service information for lead and back-up counsel. 37 C.F.R. § 42.8(b)(3) and (b)(4).

Lead Counsel	Back-Up Counsel
Adam P. Seitz (Reg. No. 52,206) Adam.Seitz@eriseip.com Postal and Hand-Delivery Address: Erise IP, P.A. 7015 College Blvd., Ste. 700 Overland Park, Kansas 66211 Telephone: (913) 777-5600 Fax: (913) 777-5601	Paul R. Hart (Reg. No. 59,646) Paul.Hart@eriseip.com Postal and Hand-Delivery Address: Erise IP, P.A. 5299 DTC Blvd., Ste. 1340 Greenwood Village, Colorado 80111 Telephone: (913) 777-5600 Fax: (913) 777-5601

APPENDIX OF EXHIBITS

Exhibit 1001	U.S. Patent No. 8,553,079 ("'079 Patent")
Exhibit 1002	Prosecution History for the '079 Patent ("'079 File History")
Exhibit 1003	U.S. Patent No. 6,750,848 ("'848 Patent")
Exhibit 1004	U.S. Patent No. 6,144,366 ("Numazaki")
Exhibit 1005	U.S. Patent No. 5,900,863 ("Numazaki '863")
Exhibit 1006	U.S. Patent No. 6,064,354 ("DeLuca")
Exhibit 1007	U.S. Patent No. 6,008,018 ("DeLeeuw")
Exhibit 1008	U.S. Patent No. 6,191,773 ("Maruno")
Exhibit 1009	U.S. District Court, W.D. Texas Time to Jury Trial
Exhibit 1010	Expert Declaration of Benjamin Bederson ("Bederson Dec.")
Exhibit 1011	"CCD and CMOS Imaging Array Technologies," Stuart Taylor, Xerox Research Centre Europe, 1998
Exhibit 1012	*In re Apple Inc*., No 20-135 (Fed. Cir. Nov. 9, 2020)
Exhibit 1013	District Court Trial Dates Tend to Slip After PTAB Discretionary Denials
Exhibit 1014	Order Resetting *Fintiv* Jury Trial
Exhibit 1015	"A Miniature Space-Variant Active Vision System: Cortex-I," Ph.D. Thesis, NYU, 1992
Exhibit 1016	In Conference Companion on Human Factors in Computing Systems (CHI '95), I. Katz, R. Mack, and L. Marks (Eds.). ACM, New York, NY, USA, 210-211. DOI=http://dx.doi.org/10.1145/223355.223526

CERTIFICATION OF WORD COUNT

The undersigned certifies pursuant to 37 C.F.R. §42.24 that the foregoing Petition for *Inter Partes* Review, excluding any table of contents, mandatory notices under 37 C.F.R. §42.8, certificates of service or word count, or appendix of exhibits, contains 11,850 words according to the word-processing program used to prepare this document (Microsoft Word).

Dated: April 18, 2021

BY: /s/ Adam P. Seitz
Adam P. Seitz, Reg. No. 52,206

COUNSEL FOR PETITIONER

CERTIFICATE OF SERVICE ON PATENT OWNER UNDER 37 C.F.R. § 42.105

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105, the undersigned certifies that on April 18, 2021, a complete and entire copy of this Petition for *Inter Partes* Review including exhibits was provided via Federal Express to the Patent Owner by serving the correspondence address of record for the '079 Patent as listed on PAIR:

Warner Norcross + Judd LLP
Intellectual Property Group
150 Ottawa Ave. NW, Suite 1500
Grand Rapids, MI 49503

Further, a courtesy copy of this Petition for *Inter Partes* Review was sent via email to Patent Owner's litigation counsel:

Fred I. Williams (fwilliams@wsltrial.com)
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COUNSEL FOR PETITIONER